A S S Please allow up to 6
be effected if mailed
needed for AGU men
all AGU subscription
gelasel, selfs label,
American Geoph
2000 Florida Ave
Washington, DC.
For feater action.
Call toll free 800-424.
or call (202) 462-6903

Eos, Transactions, American Geophysical Union

Read pattern of perar-neg(ot, electron penelpitation thring generated(inity quest period (L.o., dothy reper the period (L.o., dothy reper) (L.o., dothy repe

Vol. 65, No. 6, Pages 41-48

February 7, 1984

5560 Particles and Pields-toneapners precipication; VELOCITY SHEAR STABIL(ZATION OF THE CURRENT CONVECTIVE IESTABILITY

Q.L. Ossakow, (Revai Research

Laboratory, Mashington, D.G.;

A contnoal theory of the current corrective installety in the presence of a temporary vaciously shear is developed. At is found that the valuely shear is distributed by the stabilizes the short wavelength modes and pectarentially sective a long escalingth mode. Application to material transfer in the high (atthem served) I layer plaum estat structure in the high (atthem served) I layer high lattheds.

J. Geophys. Res., A. Papes 4A0032

J. Gasphye. Res., A. Papes AACO32

JS23 Piesma motion, convendien, or cissusetien
THE EFFECTS OF INTERPLANTIANY MAGENTA OF THE ORIGINAL
THE EFFECTS OF INTERPLANTIANY MAGENTA OF THE ORIGINAL
E. A. Healts [Geoter for Spece Set., Univ. of Traces
et Balles, Etchardese, TX JOG3]
The Atmosphere Employers Gata hase of northern
headaphere Concepterio menvection eigentuses et high
leviledes (a manusch during tiese when the interplanetary magnetic field oriestetino is relations(y
etchile, it is jound that when the HP has its
expected garden hose oriestetino; the moder of a
region where the lost flow rotates from amount to
antisummeral is displaced from local moon toward dawn
levespeative at its sign of R., Polemand of this
retaxion region, which the older, the lost connection
in directed toward dawn or died depending on whether
it is positive or magetien, respectively. The
observed liou papently use he explained in terms of a
segretosphese selar wind (tarrend in which enging
to the pre-moon southers headsphese
or the pre-moon southers headsphese
on south seeder efemities the (a toward no many);
inspectively.

1578 Pharma limtabilities
THE MAYE MORNIE OF MARKETORPHERIC CHEMIS DISSICHS
ObdERVED OF BOARD GOOS 2
N. Repatches. Desearch Inscittle of Amenipherics, Magoya
Galveralty. Topchare, Alchi, 422, Japani, 1 Yamanka.
The ways soinal dissocions of Magnetyspie o christs.

well agreed upon. At le shows these the impulsive obeys in the upper band is generated with its wave normal rouse to the oblight resonance come. This suggests that the upper band chours is quasi-absortestic, and it is upper band chours is quasi-absortestic, and it is furtherest confirmed by the eschated ratio, o'8/fit furtherest confirmed by the eschated ratio, o'8/fit intensities, a, the light velocity, while, the rising tomes in the upper band here indicated a difference such that the olosemens of their wave normals to the oblique resonance some (a such these distinct. An intensity comparises is made between the direction finding results for the upper band and the theoretical methanisms so far proposed in corder to shouldest the post-ble generation mechanism of the upper band chorus. Unique toophers, VIF emissions, chorus, direction finding.

J. Geophye. Res., A. Paper 440058

5350 Have propagation
Photestid of Plasma Wave Emergy in the automat. T.
B-RESCIE

B. S. Hoorcredt [Centre for Radio Science and
Department of Physics, Desireally of Semitire Science
London, Ostario, Canada Ed 187]
The propagation of electrostable planes were scored
in the automat E-region has been absolid using fluid
theory. Typically a were travels at high speed nearly
naminal beight interval where it is retinoised superated
throughout, the direction of the propagation vector
remains virtually monthaged, and Sergity sergendicular
to the magnetic field. If k makes at eagle of more
than 0.25 with the magnetic field the wave peace?
Through the B-region without reflection. Eighs is the
magnetic field liess: See to surroral currents) may lead
to Erapping of wayse in higher lead these like thick
Secondary irregularities may be limited in both
horizonial and werlined arises becames of their motion
growth. The propagate determining the gentitude of
irregularities have also plane considered to the light
of this work. Serviced theyered fraktures of radio
surrors may have applications in terms of thate
J. Geophyse large, A. Ashbills
J. Geophyse stage, A. Ashbills

Yews

Geophysics and Overall Science Strong in FY 1985 Budget

A Mars mission, a new research thrust on the continental lithosphere, increased elforts in digital cartography, and construction of a Very Long Baseline Array radio telescope top the list of highlights for geophysics-related research in the proposed listal 1985 federal budget that President Ronald Reagan sem to Congress earlier this month.

Science in general fared well in this fourth Reagan budget. Research and development support would grow 14% to \$53 billion 1\$51.8 billion would go to combact of R&D, while \$1.3 billion would be alloyated to R&D facilities). With a projected inflation rate of about 4%, this increase would provide real growth of 10% over fiscal 1984 levels. The largest increase for R&D, 22%, would support defense modernization. Figure 1 compares nondefense federal R&D obligations since 1978 in constant 1983 dollars, while Table I compares conduct of R&D by major departments and agencies.

Basic research would get the next largest hike, up 111% to \$7.9 billion, or about 6% growth above projected inflation. Agencies primarily supporting basic research in physi-val sciences and engineering are stated for hetter than a 14% boost, while those primarily supporting life and rather sciences would get a 5.2% increase. Figure 2 compares basic research obligations in constant 1983 dollars for the live agencies with the largest basic R&D budgets.

Of the four nondefense agencies most involved in geophysical research, the National Science Foundation lared best with a 12.4% hike; the National Aeronamics and Space Ailministration is slated for almost a 4% inerease. The U.S. Geological Survey took a slight dip (down 3.8%) in the budget request. but the National Oceanic and Annospheric Administration's support would shrink 9.5%.

Congress, with an eve on the valendar and the Nevember elections, has already beginn work on the budget (see the list of budget bearings in this issue). Eas will track the builget as it moves through Congress.

Note: Increases and do reases listed in the following analysis compare the differences between hscal 1984 and Irsal 1985, and do not reflect narmal changes in the limiting

Source: Other of Science and Technology Pol

Fig. 1. Nondefense federal R&D.

Federal R&O Obligations Mondalament in Constant 1983 Dollete

Applied Rosemon

profile when a program phases in, matures and peaks, and then phases out. Numbers

may not usual because of rounding. NSF Budget Up 12.4%

The budget request for the National Science Finandation is \$1,501.79 million:

•\$1,308.2 million for research and related

• \$115.08 million for the U.S. Antarcic Pro-

• \$75.7 million for science and engineering education • \$2.8 million for special foreign entrency

Proposed are finds for

• construction of the Very Long Baseline Array (VLBA) radio telescope • an expansion of ellous begun in listal 1981 to address researchers' needs for advanced computer witchs

· initiation of centers for cross-disciplinary research in engineering

In addition, the biolget request nearly donbles the names albicated for the Presidential Young Investigator Research Awards, which were initiated in list al 1984. In fiscal 1985, NSF plans to continue support for the 200 sciemists selected this year and to support an additional 200. About half of the awards will be made to engineering taculty.

The following percentage im reases and dollar requests are slated for the budgets of the various directorates that involve research and related adicities:

• Engineering, 21.8% to \$147.1 million Mathematical and Physical Sciences, 16.15. to \$416.7 million

· Riological, Behavioral, and Social Sciences. 12.7% to \$253.1 million Scieumlic, Terlinological, and International

Alfairs, 14397 to \$46.9 million Astronomical, Atmospheric, Faith, and Decan Sciences (AAI+0, 13.2% to \$371.5)

Within AAEO, the following percentage in creases and dollar amounts are proposed. Astronomical Sciences, 19.5% to \$93.4 mil-

• Earth Sciences, 17.1% to \$48.6 million • Ocean Sciences, 9.9% in \$124.9 million Aunospheric Sciences, 10.3% to 98.6 mil-• Arctic Research Program, 82C to \$8.0 mil-

Astronomical and Atmospheric Sciences

Slightly more than one-third of the \$93.4 million proposed for the astronomical sciences division of AAEO is slated to support the National Radio Astronomy Observatory (\$93.4 million, up 62.1%). Emistruction of the YLBA radio telescope will be the centerpiece of this program, as recommended by the National Research Council's Astronomy Survey Committee. Support for the Kitt Peak National Observatory, the Certa Tololo Inter-American Observatory, and the National Solar Observatory totals \$24.8 million tup 4.9%). The two other components of the astronomical sciences division are slated bur smaller increases: astronomy project support is slated for \$28.9 million lan increase of 4.3%), while the National Astronomy and lonosphere Center would get \$6.3 million

For astronomy project support, the biggest increases are proposed for extragalactic as-

Department or agency

Defense-military functions

Administration

Veterans Administration

Agriculture

Interior

Cominerce

All other **

Transportation

National Science Foundation

Health and Human Services

National Institutes of Health*

Environmental Protection Agency

Naclear Regulatory Commission

Agency for International Development

National Aeroquatics and Space

tronomy (up 28,5% to \$7.5 million) and for galactic autonomy (up 17.6% to \$5.3 million). Increases also proposed for fixed 1985 are for solar system astronomy (up 4.6% to \$1.3) million) and locatary and styles evolution tup 3% to \$6.5 million). Funds to support rysearch on the electromagnetic spectrum mansagement would remain the same as or liveal 1984 (\$100,000), while astronomical instyn-

In the atmospheric sciences division, the largest im rease is slated for the National Center for Atmospheric Research (NEAR) tup 14.8% to \$45.9 million). Most of this increase results from the proposal for the installation of an advanced vector computer at the Boulder-based center. (Scientific computing would get a 42.2% boost to \$13.4 millien.) Other increases within NCAR would go in annospheric analysis and presliction tup 4.5% to \$3.6 million), to annoytheric chemistry and aymnony (up 4.5% to \$2.9 million). to convective storms top 1% to \$2.4 million). and to advanced study programs (up 4.5%) to \$1.5 million). Support for administration and support services is slated to increase 4.5% to \$4.9 million and contractor levs are expected to rise 4.6% to \$941,000. Physical plant operation and maintenance would get \$5.3 million, a 42.3% hike. Stated for slight decreases at NEAR are founds for the High Abitude-Observatory (doesn 2.1% to \$3.5 million) and atmospheric technology (down 2.3% to 57.5)

Annospheric sciences project support, the largest component of the atmospheric sciencys division, would get \$48.5 million, an intrease of 6.0%. Proposed increases for individual projects hover around 8%; aeronomy is landgeted for \$6.6 million, atmospheric themistry for \$7.3 million, climate dynamics for \$7.8 million, experimental meteorology for \$5.6 million, meteorology for \$9.1 million, and solar terrestrial research for \$7.7 million. The Global Armospheric Research Program (GARP) continues to phase down Gr decrease of 6.3% to \$4.5 millions with data analysis well moderway

The Upper Atmospheric Research Licitities mogram, the smallest component of the division, would get a 7.9% metease to 53.1 mil-

Earth and Ocean Sciences

Most of the proposed merease for the earth sciences division goes to the confineral lithosphere program. Recommended as a clue) emphasis by the National Research Council's Board on Earth Sciences in their seport, Opportunities for Research in the Geological Sciences and by the National Arademy of Science's Research Briefing Panel on the Solid Earth Sciences (Em. December 20, 1983, p. 985), this program would get \$7.7 million in fiscal 1985, up from \$3.7 million is fiscal 1984.

Alter the continental lithosphere program. the largest increase goes to instrumentation

and facilities (up 20% to \$6 million). All of the other programs within the division are also stated for increased funding in liscal 1985: stratigraphy and palemunogy, op-5.4% to \$3.9 million; surlicial processes, up 7.4% to \$2.9 million; crustal structure and tectonics, up 5.3% to \$4.0 million: petrogen sis and mineral resources, our 5.1% to \$4.1 million; volcanology and mantle geochemistry, up 8.3% to \$3.9 million; and experimental and theoretical geochendstry, up 7% to \$6.1 million. The seismology program and the experimental and theoretical geophysics program each would rise 6.4% to \$5.0 mil-

In the ocean selences division, familiag for the Ocean Drilling Program is stated to in-crease 4.97 to \$27.6 million. Although cysts for the mogram are expected to rise from

1984 1985 1983 1984

Actual Estimate Estimate Actual Estimate Estimate

22,025 27,636 33,852 21,057 25,340 31,053

4.491 4.814 4.885 4.771 4.853 4.744

1,348 4,859 4,950 1,092 4,529 4,869

[3,788] [1,240] [1,342] (3,538) [3,968] (1,267]

272

281

284

198

. 168

396

6615

4025

324

312

4:35

154

2911

344

38,431 45,279 51,776 36,560 42,686 48,712

5,570 3,257 3,341 2,538

1.239 - 1.408

872

250

223

191

303

Outlave

3,462

1.136

103

349

252

. 198

174

211

1985

276

277 297

167

mentation and development would take a 15.2% cut to \$8.2 million.

People left that afternatives are frasible. and that the present lack of policies is largely due to ignurance, by both employers and employees, of practical solutions. "Surely, with so many women entering the work force, some corporations or agencies most have developed guidelines!" nost have developed guidelines:"

It would be inappropriate for AGP to propose any vicility guidelines. However, we can collect and publishes information that migla he useful. Below is a short list of relevant publications, kindly provided by Jennie Eader of the School of Industrial and Lahor Relations at Cornell, Members who know uf other publications or pulicy statements by employers are urged to share this information via the AGU Comncittee on Education and Human Re-

Forum

Two-Career Couples:

AGU's Education and Human Re-

sion on The Tweet larger Comple at die

of Eus). The rysponse was overwhylin-

1983 AGU Fall Meeting (a report on thy

session will appear in a forthcoming issue-

ing-more than 150 persons crowded into

the room, many of them midcareer prolessionals. Clearly, we had touched a

nerve. In discussion following the panel

presentation, members of the audience re-

peatedly expressed a desire for models, guidelines, or policy statements that could

he shown to air employer, especialle with reference to flexible work time, slow ca-

reer advancement, and promution policy.

Information Exchange

sources Dammittee sponsored a panel ses-

The Woman in Monagement, Parcey and Lamily Jones, Jennie Farley, H.R. Press, Cornell University, Ithaca, N. V., 112 pp., 1983,

Cities e Outcomes in a Manched Sample of Menand Women Ph D. v. On Analytical Report, N t. Abern and I. J. Scott, National Acade my Press, Washington, D. C. (1981)

Carrier and Couples. In Academic Question, 1. Hoffmann and G. DeSole (Eds.), Modern Language Association, New York, 1976. inforations and Landauer Landles Direction for the Entire, Catalysi Career and Family Center, New York, 1981

Plimbing the Academic Linkher Theorem Women Sensitists in Academic, NRU Commission on Himman Resources, National Academy of Sciences, Washington, D. C., 1979.

> Member, O.J. I duration and Human Resources Committee

\$29.5 million in fiscal 1984 to \$37.6 million in Iscal 1985, the contribution from other nations is especied to jump from \$1.2 million to \$10 million. Drilling is expected to commence at the start of fiscal 1985 (Em. January) 31, 1984, p. 33). Ocean science research support, the second component of the orean sviences division, would get an 14.5% like to \$60.9 million. This support family research in physical occanography 1\$17.2 million, up 1157), marine chemistry (\$13.4 million, up 11.7%), solunarine geology and geophysics (\$16.1 million, np 11%), and biological oceanographs (\$14.2 million, up 12.7%). The third component of ocean stiences, called oceanographic facilities and support, is dated for an 11.15 increase to \$30.4 million.

Polar Programs

AAEO's arctle research division would receive \$8.0 million for liscal 1985, an increase of more than 8% over the current liscal year. Biological sciences research is slated for the largest dollar increase, up \$229,000 to \$2.2 million, followed closely by annougheric sciences (up \$120,000 to \$1.1 million) and earth sciences (Aso up \$12(0)00 to \$1.2 million). Blaciology research has been slated for a 5.157 increase or \$2.1 million, while the fonding for occanography research in the Atetic semains unchanged at \$1.2 willion.

Money requested for the U.S. Amaretic Program, which is a separate activity and not part of AAEO, totals \$115.1 million, an increase of \$12.6 million over fiscal 1984. Antiarctic research (up 7.1% to \$11.0 million) includes fraiding for atmospheric sciences (\$2.2) million, up 1834, biological sciences (\$2.5 million, down 3.9%), earth sciences (\$1.8 million, up 5.9%), glacidogy (\$1.9 million, op 18.8%), sceanography (\$1.9 million, up 19,2%), and information and advisory services (\$700,000, np 7.7%). Operations support for the U.S. Antarche Program will imrease 12.94 to \$104.1 million.

Engineering

Wahin the Directorate for Engineering, the Division at Civil and Environmental Engineering is slated to receive \$39.8 million, a . 17.7% larost. Within the division, requested is \$4.6 million (up 17.9%) for geotychnical engineering, \$4.7 million (ap 34.3%) for structural mechanics, \$4.3 million (up 23.0%) for hydraulics, hydrology, and water resources en-

News (roat, on p. 50)

Vol. 65 No. 6 February 7, 1984

Transactions, American Geophysical Union

Ionosphere 500 for Committee and temperatures A THEORETICAL F-REGION SAUGH OF ION CONFOSIATIONAL AND THE FRANCE CAMPAIONS IN RESPONDE TO MACRATOSMENIC CHARM LINES

Particles and Fields-

the feats tolwestry, Logan, Utah Stivil, and

e. V. Sthud.

The respons of the polar icomphere to empantemphoric storm inputs was modeled. During the "storm", the stirile extent of the survent out, the instantly of the precipitation pattern were world with rise. The convection pattern with a Vi N recessaal potential to me asymetric was convection pattern with the changed loss of symmetric two—told pattern with the manned plants live in the shark sactor and a setal ctons—tall potential to me asymetric was to asymetric world as the compatition of so by N. Puring present; los compatitions and solecular/storic in respective to the feather than the compatition of the during to incessate inconstitute in the storm tention of the during the storm that the compatition of the storm tention of the during the storm tention of the storm tenti

J. Geophys. Res., J. Paper 440055

J. Gauphys. Bas., J. Paper AADUS

5501 Ion denaities and Laspeteture

540/9875 Iognormite Infessed Plecisco Densities

e. i. Entear, N. S. Barth, J. S. P. Consetted

Space Filent Callet, Gressbelt, ND 207711

Aring the two Wayser encounter with Balum, reduce

from allosophetic lish chiege states. Eithough these

burts were develed which opper to here originated

from allosophetic lish chiege states. Eithough these

burts from thousphetic lish chiege from one low

et 100 the to the upper dejection list of the Instru
not 100 the to the upper dejection list of the Instru
ion fragurap autoff halow which hursts were not de
lostes, Was often mathibutes abarp but weight

ion is at the total the resists low-fraguency states

of Chess hursts to be due to the infruction and relian
ion alle redio serms as they propects through no

listics with two tris with lose (inc. We obtain as
listed of the incevious. These compare wall with the

dates and dust dessilies assayred by the Plouwr I and

den local (inc. locations. These compare wall with the

dates and dust dessilies assayred by the Plouwr I and

dessilies facio Spience immerizations, and with model

predictions for Stylide dresilies. Numers we infer a

dentity, which had my been estilipated by there's

action fice of issopherus alsufree denvise by Salvaria

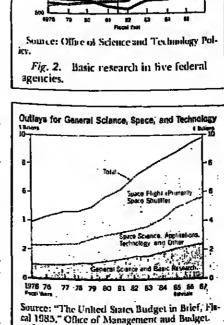
citionfice of issopherus alsufree denvise by Salvaria

rings. Idatura, electone denvise, ionospheral.

J. Geophys, Rase, A, Paper 4A0051 Viso Pacific products view ATTERNS AND TISQAL ARROWS RISCTON FRECIPITATION PATTERNS AND TISQAL ARROWS CHARACTERISTICS BOXAGO GEOMAGNITUS QUICKCERCE L. Raffer (2007APL, Lausei, helyland, 2070f) and C.-V.

THE PERSON NAMED IN THE PE

J. Geophye. Res., A. Paper 440058



Source: Office of Management and Budget. Numbers may not total because of counting. *Figures in parentheses are part of the corresponding amount for Health and Homan Services.

*Figures in parentheses are part of the corresponding amount for Health and Homan Services.

**Includes the departments of Education, Justice, Labor, Housing and Urlean Development, and Treasury, the Tennessee Valley Authority, the Smithsonian Institution, the U.S. Array Corps dl Engineers, and the Federal Emergency Management Agency.

TABLE 1. Research and Development by Major Departments and Agencies in Millions of

1983

1,012

846

3150

371.

327

Dhligatio an

49

News (cont. poin p. 49)

giorering, \$3.8 million top 15.2% t for encionamental and water quality engineering, \$2.4 million rate 20% (for construction empmeeting and building research, and almost \$20 million (ap. 13. P.); for earthquake haznot majoration

NASA: Mars and Space Station

Although the purposed fiscal 1985 hidget for the National Accounties and Space Administration (NASA), (etaling \$7491.1 milhon, shows just under a 4% increase over his cal 1984, the budget includes three majornew mutatises. Most loudly tonged of these is a permanently marmed space stanon, for which \$150 million is requested (see surv

Another minative, a Mars mission ralled the Mars Georgical e/Climatology Orbiter (MGC), would be "the first of a new series of relaively low-cost planetary observery deagain to investigate specific questions in planetary science," according to NASA Administrator James M. Beggs, MGCO was part of the core program for planetary explitation (recommended by the Solar System Exploration Committee of the NASA Advisors Commal (Ecs. May 24, 1983, p. 386, and Febmary 15, 1983, p. 65). The family requested in the liseal 1985 landget (\$16 million—within the planetars exploration cargory) would begin the design and development of the orbiter and its instruments, leading to a 1990 Lionely MGCCC soft measure the geologic and chinate ecolution of Mars.

Development of the Epper Atmosphere Research Sachhe d'ARSi will begin in fiscal 1985 CARS and place into earth or bit mirromore that will readle a comprehensive, glob-al measurement of the symposphere to be

Space Flight

Largest of the four NASA budget categor This is Space Flight, Control, and Itala Commissicators, which with proposed funding rotaling \$ 0.00 1 nollien, represents admost half of the agency budget. This category inwhile space should production, operations, and maching and data arquisition. Nest largest is research and development (\$2400 Finil home followed by research and program management (\$1.34 trinillion and consumtion of Lichtres (\$) (at at mallous)

Space Hight, Control and Data Communicatours is a new category representing an internal reorganization at the agency. Plans for liscal 1985 include 11 space should laminlies, the second and third spacelatenissions, launch of the second and third. I sacking and Data Relay Satellino (1DRSS), completion of the space should feet with the expected delicery of the Course or hiter (Atlantis) in the cember 3981, and communed bardware detelopinent for the C.S-hahan Tethered Satellite System. Specifically, funding for space shuttle production and operational capability drops III 1% to \$1 165,6 million, while space transportation operations declines 7.8% to \$1,000.0 nultion. Support for space tracking and dataacquisition grows 18 Propo \$795.7 million. Its pare the extensive plans, total funding for this category shows a latter decrease from his cal 1984, reflecting a matoration of the donde pogran

Remark and Development

Six activities fall under NASA's research and development category (1) The largest it space serice and applications, allocated with \$1.371.5 millions are become of 20,007, 121. The new space of mon would get \$150 million. in hea) 1985, while (3) space transportation cap Pality development is budgeted for \$261 Coulliers Strinking 16 Cz. 611 Lechnology utilization would be funded at \$9.5 milhon top \$500,000), Co actonautics and space technology \$192.4 million rup \$50.1 million or 12 PC), and no macking and data acquisition \$15 Cirollion applie \$1.1 million.

The space source and applications activity in time, is disided into four programs. The hist, physics and autonomy, is budgeted for \$677.2 million, an increase of 19 P7, over his ca) 1981. The largest increases within this भवन्यामा भवनोति द्वन १० १४वर्डाना भूषान्तानार जात dark and covering to 2% to \$100.1 million), to Gamona Ray Observatory development hip 19 Ct to \$120 2 pullbant, and to sliptile speeds bayload development and mission management rop 30.3% to \$105.4 million. Smaller in cross sine afforated to the subor-Lost program one 12.25 to \$58.7 millions to Explores description in type 6 (12) is \$54.9 milboost and to research and artalysis turn 3.1% to \$36.9 millione. Largetral for a slight decease. responsible to \$155,0 millions

Planetary Exploration

Plantisis exploration, the second program. wirlin spiece seie ben and applications, o builgered for a 32% increase to \$2860 million. Ment of the practicate is annihulable to the addirect of \$63.5 millers (eq. 219%) to support

the Venus Radar Mapper mission, bringing the total for liscal 1985 to \$92.5 million. The newly proposed Mary Geoscience/Climatology Orbiter is hardgered for \$16.0 million. Heliy increases also are stated for the International Solar Polar Mission (up 50% (a \$9 million) and to mission operations and data analysis 10p 35.5% to \$58.8 million). Decause much of the formulation work is completed for the development of Galilero, a alectease of 29.4% to \$56.1 million is proposed. Research atal analysis is slated for an 8.4% cm to \$54.5 million.

Spare Applications

Space applications, the third component of the space science and applications subactivity, would get an overall 18.2% linest to \$344.1 million. This program is divided into solid earth observations trlown 15,6% or \$63.6 million), environmental observations (np. 36.29 to \$220.7 million), materials processing in space (down 2.5% to \$23.0 million), communications (down 2.4% to \$20.6 million), and inframation systems (up 82% to \$16.2 mil-

Wahin solid earth observations, funding for the shuttle/spacelab payloads would grow 13.15 to \$18.1 million, while geodynamics ud research analysis would each increase 6.8% to \$29.9 million and \$15% million, respecifiely. There is no numey in the NASA ndget for Landsatel twhich, as the in-orbit Lambar-D, is handled by the National Oceanand Atmospheric Administration).

Willim environmental observations, support for the upper armosphere research safellite mission would more than triple to \$60.7. million. Extended mission operations is hudgeted for \$29.5 million (up 7.7%), upper at-unsplicte research and analysis would get \$31.0 million (up 8.8%), atmospheric dynamirs and radiation research and analysis would get \$28.5 million (up 3.0%), oceanic processes research and analysis would get \$19.4 million top tidi? I, and space physics research and analysis would reveive \$16,7 million punchanged from Isral 1984). Finding for the shunte/spacelah payload development would price 2.6% to \$7.8 million. Additions to the program include the scatteropeter (\$15 milhout, the refleced satellity payloads (\$3.0 mildans burs desease y unidejedeema but, and vsis (\$1 million). Danding for the earth radiation badget experiment (ERIG) nearly halves to \$8.1 million. The operational satellite intnovement program is eliminated in the liscal 1985 hirdget request.

The life selences program, the fourth component of the space science and applica-tions activity, is highgreal for a 9.1% increase ni \$6.1.3 million

USGS Underscores Mapping Funding for the U.S. Geological Survey (USGS) proposed for fiscal 1985 (orals \$391.8) million (a decrease of 3.8% from fiscal 1984) (See Table 2 for a breakflown of major) aregories). Digital camography, part of the na-tional mapping program, has been allocated a \$3.3 million increase. The additional firms will muiate digitizing of hydrography and trousportation data for the country at a scale of 1:100,000. This will oid the Bureau of Census prepare for the 1990 census.

Geologic and Mineral Resources

Within the geologic hazards subactivity within Geologic and Mineral Resources, none of the programs are hudgeted increases. The earthquake hazards reduction program would receive \$33.1 million (down 6.2%), resulting in a 10% reduction in earthquake equationing networks and approximately a 15% reduction in quake prediction networks. I en projects in earthquake prediction studies and five field projects on earthquake priteirtial in California would be discontinued. The volcanii Jiazards program would get \$9.5 millicat filown 12.8%, and the ground failure and construction hazards program would get \$2.1 million (same as fiscal 1984).

The land resource surveys subactivity. with a total proposed burget of \$20.0 million for fiscal 1985, includes the geomagnetism program (dnwn 9.1% to \$2 million), the climate changes program (halved to \$0.5 milling), and the geologic framework program (up 24.1% in \$17.5 million). These cuts would mean delaying final magnetic chart production for about 1 year, eliminating two research projects in develop new mathematical models, and terminating investigations assessing the link between climate change and variations in the earth's magnetic field. The geologic framework program incorporates lie reactor hazards program that had previ ously been included in the geologic hazards subactivity and includes a \$1 million initiative for cooperative federal/state geologic and

The mineral resource surveys subactivity shows a \$1.4 million increase to \$40.3 million. Slated for the largest percentage increase is development of assessment techniques, up 1.1% to \$12.8 million. Also allocated handing growth are the Alaska program (up. 1.1% to \$9.5 million), the coterminous states program (up. 3.5% to \$5.9 million), the wilderness program (un 2.4% to \$8.5 million), and the straregic and critical minerals program (up 3.3% or \$9.5 million). Increases for the coterminous wates and the critical minerals programs were for pay cost increases.

Energy geologic surveys would show a net decline of 13.6% to \$26.0 million. Some of the money from the coal investigations program and the oushore oil and gas investigaions program has been moved into a new aragram called "evolution of sedimentary ha sius," which has been budgeted for \$4.7 million in the listal 1985 budget request. Coal investigations would get \$7.4 million and oushore oil and gas investigations would receive \$4.7 million. Oil state investigations would grow 20% to \$600,000. Decreases are proposed for uranium/thorium investigations (down 19.5% to \$3.3 million) and for the geothermal program (down 25% to \$5.4 million), suspending studies of shallower, hightemperature hydrothermal resources. The

would energy program has been eliminated The fifth subactivity, offshore geologic surveys, would get a 2.7% increase to \$19.1 million. A significant part of the wrock would forms on assessing the mineral and energy resunces in the 2015mile Exclusive Economic

Water Resources

Within the National Woter Dota System: Federal Program subjectivity, a \$9000,000 increase has been affocated to the data collection and analysis program, bringing its hind-get up to \$16.9 million in the next fiscal year. Other increases within the subactivity have been apportioned in the improved insuramemation program (up 59 to \$2.1 million). the water resumees assessment program (up 7.7% to \$1.4 million), the toxic substances program (formerly called the toxic wastegroundwater communication program) (up 4.7% to \$8.9 million, the acid rain program 10p 6.79 to \$3.2 million), the environmental affairs program top 14.3% to \$800,000), and the condination of national water data activities program (up 11.1% in \$1.0 million to enver pay cost increases).

Decreases in the subactivity are slated for the national water data exchange program down 23.1% to \$1.0 million (resulting in a 10% reduction in capability to respond to in quiries), the regional aquiller systems analysis program (down 3.5% to \$14.6 million), the core program of hydrology research (an 8.5% drop to S6.5 million), and supporting services (a two-thirds can to \$1.1 million). The budget this year keeps the water resources scientific information center at \$200,000 and again allocates un money to the flood hazard analysis

Within the National Water Dota System: Federal/State Cooperative Program, the data collection and analysis program would get a 1.7% limits to \$42.7 million to cover pay cost

TABLE 2. USGS findger, in Millions of Dollars

| Adivity | LY (983 | FV 1984 | FY 1985 Proposil | Change, 1984 (n. 1985 in Percent |
|---|---------|---------|---------------------|--|
| Geologie ond Mineral Resource Surveys | | · | _ - | |
| Occurrent programs | 31.6 | 51.4 | | |
| Land resource surveys | 17.5 | 17.9 | 44.8 | -12.x |
| Mineral resonare surveys | ii.i | 44.9 | 20.0 | + [6.3 |
| Energy geologic stayers | 31.2 | | 46.3 | +3.1 |
| Ollshore geologic surseys | 15.5 | 30.1 | 28.0 | - { :1.fi |
| Sulima | א.951 | 18.8j | 196.1 | +2.7 |
| Woter Resources Investigations | 100.11 | 162.2 | 158.2 | ~3.7 |
| Manufat Water data System: federal | | | | |
| National water data system: lederal/ state cooperative program | 59.1 | GU.A | 58.5 | -3.0 |
| Energe hydrodoge | 15.8 | 48.1 | 514.1 | 490 |
| Warr Records Several Institute | 15.1 | 11.9 | 7.9 | +2.0 |
| Subtotal | 11 | G.4 | a | -35.fi |
| | 116.0 | 127.g | 116.6 | -100.0 |
| Notional Mopping Program | 90.7 | 90.1 | _ | -8.7 |
| Facilities | | | 90.4* | +0.5 |
| Ceneral administration | 9.0 | 10.4 | 13.3 | +27.9 |
| Total, USGS | 14.9 | 16.5 | 15.4 | |
| | 390.5 | 405.9 | \$91.g | -0.g |

*Includes \$11.3 million for digital cartegraphy, up 11.3% from FY 1984 and up 182% from FY

Budget Hearings

The tentative schedule for congressional hearings on the Reagan hindget request for fiscal 1985 is listed below. Dates and times should be scribed with the committee or subcommittee holding the hearing; all offices on Capitol Hill may be reached by (elephoning 202-224-312 f.

February 22: National Science Foundation (NSF), by the Science, Technology, and Space Subcommittee of the Senae Commerce, Science, and Transportation Journittee, Senate Russell Office Building, Room SR-253, 9:30 A.M.

February 22: Notlonol Aeronautics and pace Administration (NASA) (space ransportation systems), by the Space Scinice and Applications Subcommittee of the Flouse Science and Technology Comnince. Raylorn House Office Building. Roum 2325, 1 P.M.

February 23: U.S. Geological Survey, by the Interior and Related Agencies Sub munitiee of the House Appropriations Committee, Rayburn House Office Building, Room 11308, 111 A.M.

February 23: NSF, by the Science. Technology, and Space Subcommittee of he Senate Commerce, Science, and Transportation Commince. Senate Russell Office Building, Room SR-253, 9 A.M.

February 28: NASA, by the Science. Technology, and Space Subcommittee of the Senare Commerce, Science, and Transportation Committee, Senate Russel Office Building, Room SR-253, 9:30 A.M.

February 28: NSF, hy the Science Reearth and Technology Subcomminee of the House Science and Technology Committee. Rayburn House Ollice Hollding. Room 2318, 2 P.M.

February 29: NASA (space tracking am data systems and technology utilizations. by the Space Science and Applications Subcommittee of the House Science and Terlurology Subcrimmittee, Raylmin Flouse Office Building, Room 2025, 1

February 29: NSF in the Science Research and Technology Subcomminee of the House Science and Technology Committee. Rayburn House Office Building. Room 2325, 3:30 A.M. March 1: NASA, by the Science, Ledi-

indagy, and Space Subcommittee of the Senare Commerce, Science, and Transpor tation Committee, Senate Russell Olline Building, Room SR-253, 9 A.M.

March 1: NASA (emistrib tion of larifities and research and program management), by the Space Science and Applications Subcommittee of the House Science and Technology Committee, Raylann House Office Building, Room 2323, 10

March 8: NASA, by the Science, Techunlogy, and Spare Subcommittee of the Senate Commerce, Science, and Transpor tation Committee. Senate Russell Office Building, Room SR-253, 9 A.M.

March 18: Markup of the amborization for the NASA landget by the Space Science and Applications Subcommittee of the Fluise Science and Technology Committee, Rayhuru Hrurse Office Building. Room 2025, Balt A.M.

March 29: NASA, by the HUD-Indeendent Agencies Subcommittee of the Senate Appropriations Committee. Senate Dirkson Huibling, Ruent SD-124, 10 А.М.*—ВТК*

increases, while lunding for the water use program would drop by nearly 25% to \$3.0 million. The wal hydrology program has been allocated \$4.4 million, a \$7.5% increase.

In the energy hydrology subactivity, the nuclear energy hydrology program would receive \$7.6 million tup 5.6%; and the oil shale hydrology program would receive the same funding as in liscal 1984, \$500,000. The coal hydrology program that had been comained in this subactivity has been consolidated with the coal hydrology program in the federal/ state cooperative program.

The Water Resources Research Institute has been eliminated from the Water Resources Investigations activity.

NOAA Budget Declines

The total budget appropriation request for the National Oceanic and Annospheric Ad-ministration (NOAA) is \$899.3 million, a decreose of \$94.2 million from the fiscal 1984 appropriation of \$993.5 million. The budget includes proposals for users of NOAA's services to pick up a greater share of the costs. for the continued funding of the Next Generatinn Weather Radur (NEXRAD) and the modernization of the National Weather Service, and for the procurement and operation of two geostationary and one polar-orbiting meleorological satellites. The budget request consists of a program requirement of \$1,017.8 million, which would be offset by various tronsfers, adjustments, and revenues from service charges that total \$118.5 million.
The lion's stare of NOAA's funding would go to Operations, Research, and Facilities (ORF), targeted to receive \$921.5 million,

\$93.5 million less than appropriated for fiscal 1984. Many of the curs proposed for ORI had been requested for fiscal 1984, but were subsequently restored by Congress, ORF is divided into twe activities; ocean and coastal programs, marine fishery resource programs,

armospheric programy, satellite and environ-mental data and information services, and

Atmospheres and Satellites

Atmospheric Programs

program support.

Beuer than one-third of ORF's trinks would go to the annospheric programs activi-19. The landger request of \$358.2 million (down 2.1% from fiscal 1984) is split between ordic warning and forecasting services \$311.0 million, virtually unchanged from I'Y 1984) and atmospheric and hydrodogic research (\$47.2 million, down \$6.1 million). Among the proposals included in the decreases for public warning and forecasting services are closing the southern region headquarters, climinating regional hydrologists offices, reducing shaft at eight weather service forecast offices, and reducing night staffs at those offices. The decreases slated for annopheric and hydrologic research include reducing limiting to the Prototype Regional Observations and Forecast Service (PROFS) (Eos, April 13, 1982, p. 233), to National Weather Service research and development

Sotellites and Environmental Data and Information Services

For speediest treatment of contributions send three copies of the double-spaced statute up to one of the educis named below and one copy to

Editor-in-Chief: A. F. Spillans, Jr.: Editors: Matrel Ackerman, Mary P. Amleyvon, Peter M.

LOBB J. LARGE C. LOBB, ARROW J. COMMON.
LOBB J. LARGE C. LOBB, A. PHIRILEY, Managing Editor: Gregg Foste; News Writer: Barbara
T. Richman; News Assistanti Tony Reichbardt:
Production Staff: James M. Hebblethwaie, Dae
Sing Kim, Parikla Lichteillo, Lisa Lichtenstein,
Combin T. M. Mariani.

Bell (News), Risice Doc, U. Siewart Gillitor (History), Clyde C. Good, Arnold J. Gordon

James A. Van Allen, President; Charles L. Drake, President-Elect; Leshe H. Mesedith

General Secretary; Carl Kissinger, Foreign Ser-

retary; A. F. Spillions, Jr., Executive Director; Waldo E. Smith, Executive Director Emeritus.

For advertising information, contact Robin E.

Lude, advenising coordinator, toll free at 800-424-2488 us, in the D.C. asea, 462-6903.

Cover. Water flow paths in geothermal

energy reservoirs are often diminiated by

fractures, whether natural or hydraolically

influced, as is the case in the Los Alamos

Hot Dry Rock project. The extracted water must be disposed of after its energy is

removed for benchcial purposes, and of-

cooled water back into the same fractures

from which it was extracted. In that case

the objective is in avoid too early an arriv-

al of the cold recharge at the extraction

well and at the same time avoid the ex-

tances away. An attractive alternative in

tures is to ausin adequate separation by using gravity and the density difference

between the cold recharge and hot efflu-

ent. For a given geometry the effective-

ness of gravity separation impruves as the ratio of the Grashof and Reynolds muni-

bers increases: Increasing the water densi-

ly difference or the fracture permeability

The apparatus in the photos represents a vertical fracture viewed from the side.

The upper clear plastic tube provides the

for recharge; and the recirculated water is

cooled in a peripheral heat exchanger, not

shown. The water is confined between a

transparent, Plexigles sheet (in Iron) and

metal framework idiached to the Plexiglas

sheet allows accurate and uniform setting

of the distance between the confiring sur-

faces, thus controlling the fracture perme-

Streamlines are observed through the use of two methods. In the licst method,

of Fluid Merhanics, 26, 573-575, 1966),

using the technique of D. I. Baker (Journal

fine platinum wires were immersed in the

water (which is actually a dilute solution of

an electrically-heated back surface. The

hot water mitlet; the tube below is user

enhances separation, but increasing the

recharge rate iliminishes it.

the case of vertical or steeply dipping frac-

pense of piping the recharge great dis-

ien the hest recourse is to reinject the

Officers of the Union

to acid rain research, and the climination of

rosmental Laboratory.

research and some services at the Solar Fuvi-

The second largest of ORUs five activities. Satellite and Environmental Data and Infor mation Services, is budgeted for \$271.7 million in list al 1985, an moreave of \$22.0 million. The largen bourst -25% - within this at tivity would go to the satellite services subactivity. The \$84.9 million allocated world allow NOAA to assume responsibility for the Gilmore Creek, Alaska, data arquisition stafor now operated by NASA, and would fund operation processing of solar lankscatter oftravider data and for correction of system debeiencies in the polar ground system. In addition, the geostationary satellite's temperature and moisture sounding capability would be converted from a research prototype to an operation system by operading the ground

Satellite systems, the largest subactivity, is stated for a 4.1% hike to \$104.2 million, which would allow the prorurement of a spacecraft and associated launch services to Continue to convert trea one polar satellite system. Funding for the last subactivity, data and information services, would show a 1.4% drogeter \$22.6 million.

Ocean and Constal Programs

Next largest of ORF's activities, called ocean and coastal programs, allocated \$106.1 million ta drop of better than 25% i, is fireft. divided jum six categories: nonliving marine resources tent by nearly two-thirds to \$1.3 million), ocean research tom by one-third to \$18.0 million), pream services (down 29.6%) to \$1901 million). Sea Grant tonce again proposed for elimination), mapping, charling, ud geodesy programs (slated to increase) w 25% to \$62.2 million), and coastal zone managritent, which in the past Congress has hid genal separately (skated to receive \$5.6 unl-

Within nonliving masine resources, the budget represt proposes to climinate the po-lymetallic sulfide program and the ocean

Copyright 1980by the American Deophysial

Uman. Material or this issue may be photorope

red by androphial scientists for research or clas-

coon use. Permission is also granted to use

short giones and figures and tables for publica-

tion in sergido bools and pirmals. For permis

sion for any other uses, contact the AGU Publi-

Views expressed in this publication do not necessarily relien official positions of the American Geophysical Union wides expressly stated.

Subscription price to members a included in an

nual three (\$20 per year) Information on invi-

nutonal subscriptoris is available on respect Second-class parage tand at Washington, D. C., and at additional mailing offices. For Transfe-tions, American trophysical Union (1888) 0006– 39411 is published weekly by

American Geophysical Umon 2000 Florida Avenue, N.W. Washington, H.I. 20009

thymol blue trhymolsulphone phthalein) ti-

trated to the end print). When the wires

are electrically charged, the current flow

and resulting pH change cause the sidu-

tion passing over the wires in turn blue.
Continued application of voltage on many such wires distributed throughout the

fracture reveals the steady state streamline

ously prepared volume of blue sudminn is

patterns. In the second method, a previ-

injected into the recharge just before cu-

try imu the fracture. One then observes

this method is analogous to the tracer

technique used in actual reservoirs.

the time-development of the fluid motion;

In (a) the density difference is zero and

the tightly bunched streamline pattern re-

lustrates flow "short circuiting," which re-

Reynolds number ratio, 2, the tracer tech-

sults in rapid reduction of ellluent tem-

nique reveals the llow pattern in (b), in

diarge first flows downward, thus delay-

ing thermal degradation of the elthent.

For a very large Grashuf/Reynolds number ratin, 40, the patterns in (c) mul (d) re-

sult. Using the tracer technique, (c) shows

the formation of a descending jet. The

motion after the jet encounters the frac-

ture bottom, turus, and then llows to the

delayed for the maximum possible duration. The oscillatory appearance of the de-scending jet in (r) is the to the Kelviu-

extraction (nbe; thermal degradation is

Helmlinliz shear instability. Another,

more familiar example is the formation of water waves from the wind. (Pluntos cour-tesy of investigators Hogh Murphy, Scott Faas (now at Sandia National Labora-

tories, Livermore, Calif.), and Paul Nab-

holz (now at SEDCO), Inc., Dallas, Tex.),

Los Alamos National Laboratury, Lis Ala-

mos, NN 87545.)

charged wires depict, in (d), the water

which a substantial fraction of the re-

perature. At a moderate Grashul/

Intional subscriptions is available on request

Transactions, American Geophysical Union

The Weekly Newspaper of Geophysics

thermal energy conversion program. Cuts to the ocean research subacticity include terminating the Undersea Research Program and Strinking the OASTS/TOGA project. Also proposed is the closing of the Great Lakes usironmental Research Laboratory 04 ERLs; the fiscal 1984 budget request also roposed to close the laborators (Em. May-17, 1983, p. 378), for Congress restored ir.

Increases for the ocean services submixing are proposed to poser the rost of producing tide and current publications; receipts from charges for this service will be deposited in the federal treasury. Derreases are proposed for, among others, the circulatory program, the marine boundary survey program, the Chesapeake Bay study, and the bathymetric wath survey system project. The liscal 1985 langer proposes to terminate the Sea Grant Program: Congress has restored the program

Although the program level will remain the sine for the mapping, charting, and geodesy subartivity, decreases are proposed in acro-nantical chart services and nautical chart services. Direct limiting of technical support to state geodesy programs would be reduced and a state-specific geodetic survey program would be eliminated. The president's budget requests that namical and accommitical chair prices be increased to more accurately reflect heir Jult market sahre.

Coastal zone mnoagement (CZM) has been included in ocean and coastal programs with a proposal to phase our the CZM state grants. program, recliminate the states' assistance program, and to reduce the estuarine sanctuary program.

Mariae Fishery & Program Support

The marine lishery resource programs, the fourth activity within CRF, is budgeted for a 35-5G cur to \$920 million. This mcludes \$59.1 million plown \$12.7 million; Cor information collection and analysis, 529, (million (down \$21.1 million) for conservation and management operations, and 5-t.1 milfrom (down \$17.2 million) for state and militany programs.

ORF's list activity, program support, has been allocated \$92.8 million, a cut of 17.2% from fiscal 1984. Proposed decreases include eliminating the National Advisory Committee on Oceans and Atmosphere (NACOA), redusing general administration, dearivating the lisheries research their, reducing days at sea, laving up of the Successor and the Freich reducing maintenance on both those ships and on Freezeo, and closing the southeast marine support facility.—BIR

Space Station Proposed

In his State of the Union address on Jamiary 25, President Ronald Reagan announced that he was directing the National Aeronanurs and Space Administration (NASA) to "deselop a pérmaiently manned space station. and nedo it within a decade '

Included in the NASA budger proposal sent to Congress the following week was \$150. million for the station. This is the bist request of many; expected costs will total roughly \$8 billion by the early 1990's

As currently configured, the space station will be launched and temled by the space. shuttle and provide living and working space for a crew of 6–8 people. Some Gree Hving, impressurized platforms would carry sensitive instruments that could not function with the namual josilings of manuel undules. NASA. which has been lob(wing tor a source station for several years, has invited international narriensacione

Not everyone agrees that a space station would, in the words of President Reagan. "perinit quayum leaps in our research in so circe, communications, and manufacts and life sixing medicines which can be manufactured. only in space. A report issued by the National al Research Conneils Space Septice Board asseried that there is no scientific need for such an embessor for at least 2 decades. In addifrom some researchers words that the mosgram will detract both funds and anoution tream other programs.

Gravity Theory Test Planned

The National Arronautics and Space Aifmunistrariou (NASA) has decided to proceed. with one of the most sophisticated atompts. vet to test Einstern's gravitational theory. The gopored Stayns Proba Banarannanet spacecraft program has been included in the agency's Fiscal Vear 1985 landget request, but only after considerable in-dept h evaluation. hoth scientific and Justicial. Budgeted at \$1.8 million for study in fiscal year 1981, it has been proposed at \$3-5 million in Irval year 1985 inder the Physics and Astronomy Research and Analysis section of NASA's bud-

The idea of Gravits Probe B is to test the eneral theory of relativity by examining in ine detail changes of the precision parameiers of an earth orbiting gyroscope (Samee, 223, 30, 1984). The gyroscope will be a cryogenically cooled, highly sensitive institutent pecilically designed for the measurements. The engineering concepts have been under desclopment for decades, and although the effects being sought are subtle, the experinent is considered to be within the realm of

As with almost all experiments designed to est general relativity theory, Gravity Probe II has the appeal of making a substantial contriution to basic physics as well as to astrophysics and geophysics. At the same time, such a contribution carries the stigma of being basir nd difficult to obtain and thus a bit far out ol the main stream of space science projects.

NASA lei the scientific community decirle on this project in the sense that a great demmistration of support from a broad sector of scientists ontil be insuffication for new fundto compete with other planned projects for a place in the existing budget request. "Deputy administrator thans Mark has simply the carened to delete it from the agency's budget. It is an impostal technique to say the least, but effective: the space science community is uldiging him with process, letters, and mitaged statements of support bir the mission," according to Science.

"This "mmage" resulted in strong endorsement by the Space Science Board and from many powerful supporters within the scientilic community. Assuming the the hodgets are approved. Grasity Probe B will lly in the early [990's.--/'AIII

Active Faulting Near Taupo

The new confirmed fault displacement in New Zealand since that accompanying the 1968 Inangahua Earthquake was observed on June 23 and 24, 1983, 4 km west of Tangor in the Taupa Volcanic Zone, central North Island (Figure 1). Normal displacement occurred on the late Quaternary Kaiapo fault,

previously active in 1922, when almost 1 in of normal land displacement was observed Beorge, 1932). The Katapo Landers one of a number of north-east trending normal laids that constitute the active Europe Lauk Belt. Bondley 19611 Current extension rates by to 7 mm per year have been calculated from gradetii observations (Sisson, 1979) acrossthe northern part of the Laupo Volenne

Maximum displacement 2 km north of Take Tampo was 50 min upilitios to the southeast with 30 turn extension across the steeply dipping normal tanh. No still e-dipdisplacement was observed. Loral length of the observed 1983 sin lare trace is 1200 m. comprising a set of tensional cracks up to 19 in in length, locally left stepping en echelonin nature (Figure 2)

Following several Modified Metralli (MMt 4-5 intensity cardiquakes reported on June 20 and 21, 1983, a local resident nonced a number of cracks near the base of the Loth scarp on his property south of Mapara Road. Following more MM 3 and 4 carrlignakes on the night of June 23, the cracks propagated to the northeast and on the morning of lime 24. a scientile inspection team observed displacement of the surface of Mapara Road.

These earthquakes were part of a local swarm that had commenced an June 10. Earthquake magnitudes were up to 3.9 with a maximum of 20 telt esents per day. Earthquake actisits in the area of the fault displacement died away by June 29, migrating first to the morth then to the small below Lake Taujai. Active fault displacement appears to have ceased following June 23, although seismicits and minor ground delurmation continued.

The surface displacement occurred within the Koiapo (ih-leveling pattern, one of 12) such arrays regularly monitored by New Zea-47 mm of displacement was measured on one of the 600-m long parcise-lessling radials in agreement with the observed surface displacement. In addition, regular preasurements of Lake Tampo water level taken as part of a regional vertical deformation monitoring program recorded relative unlift in the epicernal area for at least 3 months prior to he swarm. Rapid subsidence totaling 50 mm and displacement at the Katapo Fault were associated with the carthquake swarm (Figure

Prior to the Kaiapo lanking, during an earthquake swarm on the western margin of the Tanpo Volcame Zone in February-March 1983, a seismographic network was established for one week west of Kodoch (Figure 1). Associated regional uplift (Figure 3) led to udditional lake leveling stations being in-

After the Kaiapec lauking, seismographs were again deployed around the northern shores of Lake Tampo from June 29, 1983, until July 4, 1983, recording events largely to the south of the surface built displacement. that of magnitude 4.3 on July 1 being the largest event recorded. A composite focal

News (cont. on p. 52)

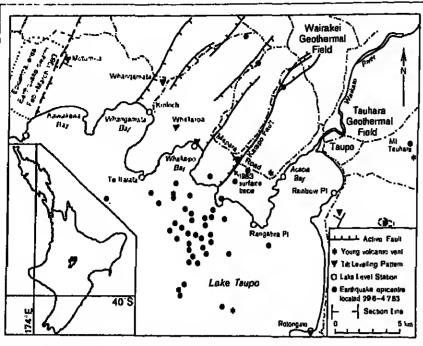


Fig.(I) Northern Lake Tampo region showing epicenters of early July 1993 carthquakes in relation to active taulting and young volcanic centers. Location of Kaiapu Fault break shown



Fig. 2.— Detail of surface trace with autimal track displaced 50 min down to the norther stand 20 min extension. Hannier is 30 min through

nichonym gave a horizontal I-W tennonal axic in ago ement with regional extension. Epicential positions, for all depth and mechanisms, and bevalue or early preliminary. The histories of 0.75 ± 0.41 is similar to that determined or the meanly Warraker Grothermal Field [Phot and Lates, 1982] and to that determined in the enty 1983 Kinloch swarm (T. H. Webb), personal communication, 1984.

Officers of New Zeal and Geological Survey and Seigmological Observatory. Femplicates Dresion: Department of Scientific and Industrial Research, are tesponishe for geodetic geological ake level and veisionity observations both at the 1983 Izuli trace and elsewhere within the Lake Tampo Region. Precise leveling on some of a 50-km transect of the Tampo Fault Beli to the purth is emerging tepeated by the Department of Lands and Survey to both for fundered surface debouration. Detailed results are to be presented at the both oming Recent Crustal Movements Symposium to be held in Wellington, New Zealand this uponly.

lington, New Zealand this month.

Further information is available from A. G. Hall and G. W. Grindley, New Zealand Geological Survey, Box 30-308, Lower Flant (geology); P. M. Oncay, New Zealand Geodogical Survey, and T. M. Hant, Geophysics Division, DSIR, Puvate Rag, Tampu (geodesy, lake leyeling, ceismicity); and From T. H. Wehb, Seismological Laboratory, California Institute of Technology, Pasadena, CA 20100 (seismology).

Referruce

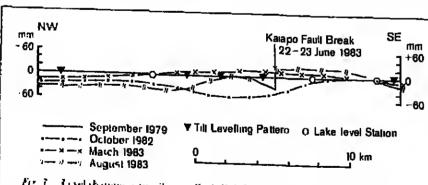
Frange, L. T., Tanpo earthquakes, 1922: Rents and fants formed thiring earthquake of 1922 in Tanpo district, N.Z. J. Sci. Vecknol. 14, 139-141, 1932.

Grindley, G. W., Leedingleal map of New Zealand, scale 1:63,966, Short N94, Trispo, Department of Scientilic and Industrial Research, Wellington, New Zealand, 1961.

Hunt, T. M., and J. H. Latter, A survey of scientic artivity near Wainake Geothermal Field, New Zealand, J. Folonod, Geotherm, Rev. 14, 319-331, 1982.

Sissons, B. A., The horizontal kinematics of the North Island of New Zealand, Ph.D. thesis, 118 pp., Victoria University of Wellington, New Zealand, 1979.

This news treat win contributed by Alan G. Hull and George W. Grindley, who are with the New Zealand Geological Survey, Lower Hutt, New Zealand.



Fig=7 . It evel changes across Tarqui Fault Belt before and after the earthquake swarm and Lindi Liveak of Lite [100] and early July 1983. For pudition of line see Figure 1.

VLBI Observatory Begins Operations

A tick radio releasing observatory located at Richmond, Ela turar Mondi, made its lins stocked Wery Long Basebiae localerometrs (VI Bit observations on December 9, 1983, according reals. National Geodetic Survey (Mas). The ten vession was followed in Describer 21 by the first operational observing session of the Infl. three station PDI ARIS (Polar Motion Against by Radio Interferometric Surveying redsouth the Richmond facility plus observatorses mear florion. Mass., and El Sase, Tex.).

The PDLARIS intwork was joured in the historic December 21 observing session by VLBI observatories in Creata. Sweden, and Westrell Ersteral Republic of Distribution. Only 8 hours of operations yielded sufficient data so determine the hours of the Redutional site tetake to the other four Numb American and European observatories to welling tractional a mater. Retinements will quickly

reduce am criainties to a 1-w outlineters.

Regular, 24-hour observing sessions with the POLARIS network will allow geodesistent monitor the widdle of the earth on its asix—a phenomenon known as polar motion—and variations in the rate of cotation of the earth, i.e., the passage of Universal Time. The POLARIS stations will also be used in compuntion with mobile VLB1 systmes to study deformation of the North American recomb places to study debute, and with observations on different places to study global plate mutages.

The first successful discretations from the Richmond POI ARIS observations from the Richmond POI ARIS observations from the Richmond POI ARIS observations culminated togaths 7 years of plauning and huilding by NGS to component of the National Oceanic and Atmospheric Administration), the U.S. Naval Observators, and the National Acronautics and Space Administration (NASA), aided by several other organizations. The 17-in-diameter radio felecorpe was donated by the Carporice Instinction.

the Carnegie Institution of Washington, All three POLARIS uluservalories are equipped with the state-of-the-art Mark III VLBI data acquisition system, developed by a team of scientists and engineers from the Massachusetts Institute of Technology, Haystack Observatory, the National Radio Astronomy Observatory, and Goddard Space Flight Center, under funding from NASA and the National Science Foundation. The Mark III VLIII system can record as many as 112 million bits of data per second. During a typical 24-hour observing session, each observatory records more than a trillion bits of data. The entire process of collecting and reducing the data relies heavily on computerized automation.

ized automation. The first two POLARIS observatories have been operating for nearly 3 years. The PO-LARIS length-of-day series captured an exranrdinary change in the rate of rotation of the earth during January and February 1983, coincident with the strongest episode of the El Niño ever recorded. Early success of project POLARIS has led scientists in several nilier nations to develop dedicated geodetic VLBI observatories. The first operating foreign observatory is located in the village of Wettzell in Bayaria, Federal Republic of Germany. Others are nearing completion in Ja-pan and the People's Republic of China. Together with the POLARIS phiservatories, these stations will form a global geodetic VLBI network, kunwn as the International Radio Interferometric Surveying (IRIS) sys-

The IRIS stations are also supporting at even broader international effort, organized by the International Union of Geodesy and Geophysics and the International Astronomical Union, known as project MERIT (Monitor Earth Botation and Interemptate the Techniques of observation and analysis). Project MERIT involves the application of several advanced (echnologies finefulding VLBI, satellite laser ranging, and linear laser ranging) to the study of the dynamics of the earth.

This arms note was contributed by William E. Carter, who is with the National Geodetic Survey, Rockelle, MD 20352.

Molecular Computers

Lamputer circuits conviving of organic molecules could offer a solution to problems to recent in future processor designs. Genphysicity and astronomers are among those needing lunge, ultrafast computational facilities. It takes the altimate in computing power to track third flow in petroleum reservoirs, to madyze data from 3-dimensional instrument arrays, and to conduct imaging measurements of planetary surfaces in real time.

In a sense, silicon and germanium integrated computer circuit designs are running out of the time-space dimensions to fill the need. Organic molecular circuits, some of which will contain no metallic conduction elements as normally conceived, may be able to be produced with appropriately small time delays and physical dimensions between electronic elements. Because of limitations of conventional integrated circuits, the number of transistory that can be fabricated onto a single chip may never exceed 0.6-1 x 11%. This number may have no relevance to molecular conjuner circuits, in which logically based entities provide intelligent switches much like

those of living systems.

A molecular computer is still a long way from being a reality, but interest in their potential is rising rapidly. In a recent workshap on chemical-based computers, spunsured by the National Science Foundation, new avenues for research were being considered. F. Engene Vates, head of the Crump Medical Institute of the University of California, which orsponsured the conference, stated, "11 we go to a undecular computer... we're talking about achieving spracing of elements 1/4 Luttud of that [attainable with silicint]... we could probably increase computational divertity between 1 and 10 million times what can be done at present" (Research and Development, January 1984).

A appropriite make the

A conqueitive molecular computer may not arrive until the next century; however, when it does appear its properties may be impressive. What is predicted is the application of current biological engineering, ranging from those related to recombinant DNA to protein and enzymes. The new biological computers could have "mosel" changes to aid in parallel processing of signals. Molecular electronics in general is likely to exploit the full range of hischemical advances. The existing discovery of organic superconductors may find useful application in producing the lirst resistance-true conduction actually used in computers.—
PARI

Cornell Continents Institute

Council University has furmed a new research unit to study the origin and evolution of the countinents. Initially, the new Institute fur the Study of the Countinents will comprise research efforts in geological sciences at Cornell now carried unt under the Cornell Program for the Study of the Continents, the Consortium for Continental Reflection Profiling Project, the Andean Project, and related studies of crustal geology. The institute will

be quartered with the Department of Geological Sciences in Suce Itall, an earth science facility now under construction. Jack Oliver, former chairman of the Department of Geological Sciences, has been appointed to a 5-year term as first director of the Institute.

This new tern was contributed by Thomas Evertuart, who is with the Callege of Engineering, Cornell University, Ithaca, NY 14853 0125.

Geophysicists



Peter S. Engleson

Peter S. Engleson, of the Massachuseus Institute of Technology civil engineering department, has been named Edmund K. Turner Professor of Civil Engineering. Correctly president of the AGU Hydrology Section, Engleson in 1979 received the section's Humon Award. Engleson lass been a member of the MIT faculty since 1955 and was chairman of the civil engineering department from 1970 to 1975.

Peter Brewer returned to the Woods Hole Oceanographic Institution after 2 years as the program director for the macine chemistry program in the National Science Foundation's Divising of Ocean Sciences, Carlis A. Collins has returned to the division as program manager for ocean dynamics after spending I year at Woods Hole as a guest investigator in physical oceanography.

Tjeerd Von Aodel, professor of occanography at Stanford University, has been awarded the Van Waterschoot Van Der Gracht wedal from the Royal Netherlands Geological Society for his lifetime contributions to the earth

John G. Weihaupt, formerly the dean of graduate studies and revearch at San Jose State University in San Jose, Califf, is the new vice chancellor for academic attains at the University of Calorady in Deniver.

Recent Ph.D.'s

Ess periodically llars indomnation on generally accepted dos toral discertations in the disciplines of geophysics. Eachly members are inched to submit the following information, on institution letter head, above the signature of the facility advisor or department chairman:

(1) the dissentation title. (2) author's name,

 (3) name of the degree-granting department and institution.

(l) faculty advisor, (3) month and year degree was awarded.

Il possible include the current address and teledome number of the degree recipiem (dis information with an be published).

Divertations with order manbets, and many of Divertations with order manbets, and many of the others listed, are available from University Mitrollins International, Divertation Copies, P.D. Box [764], Ann Arbor, MI 48106.

Analysis of Solution scal Gas Phase Molecular States of Fromaldeleyde by Gas Chromatography and Chemical Innization Mass Spectrametry, David F. Unterback, Undy, of North Carolina, Chapel Hill, 1983 (GAN83-26261).

Application of Optimization Methods to the Inversion of Aeromagnetic Data (Brazil), Louveniblo W. B. Leite, Saint Louis Univ., 1983 (GAN83—2388).

Association of Cobult, Nichel, Copper, and Zinc With Icon and Manganese Oxides of Soils, James A. Frampton, Univ. of California, Davis, 1983 (GAX83-26072).

Clastagenic Activity of Phenolic Oxidation Products, Ann F. Hanham, Univ. of British Columbia (Canada), 1983.

Diagonicsis and Reservoir Qualities of the Jurassic Navajo (Nagget) Sandstone in Utah and Southwestern Wroming, Kadir Ucgur, Univ. of Utah, 1983 ut. A88-25942).

Differentiation of the Nebo Gravite (Main Bushyeld Granite), South Africa, Dennic R. Mac-Caskie, Univ. of Oregon, 1983 (GAN85-25284). Effect of Organic Pure Fluids on the Fabric and Geotechnical Behavior of Clays, Ellem D. Gilligan, Syracuse Univ., 1983 (GAN85-25284).



Books

Carbon Dioxide and Climate: A Second Assessment

Report of the COs/Climate Review Panel, National Research Council, National Academy Press, Washington, D. C., xx + 72 pp., 1982.

The Long-Term Impacts of Increasing Atmospheric Carbon Dioxide Levels

G. J. MacDonald (Ed.), Ballinger, Cambridge, Mass., xxiv + 252 pp., 1982, \$35.

Reviewed by A. Berger

Introduction

There are quite a large number of excellent puldications now available in the domain of carbon dioxide and climate. After a period of intense research on the subject conducted ander the spoosorship of national and international institutions like the U.S. National Research Corneil, the U.S. Department of Energy, the Environment Agency of the Federal Republic of Germany, the Scientific Commitee on Problems of the Environment, the International Institute for Applied Systems Analysis, the World Climate Program, the Commission of the Environment, the Commission of the Environment Communities and others, syntheses are now possible.

and others, syndreses are now possible.

Over the past decades, extreme climatic events in different party of the world have made us aware of our vulnerability to climate variations and variability. But it is also more and more recognized that not only usan may possibly be affected by climate but also that climate is vulnerable to man's activities. These human activities, especially those related to industrial processes and the poactice of agricultural learning and soil management, result in the release of particles and tracy gasey in the atmosphere. The increase of atmospheris CO; which is worldwide poses a special problem of major contern.

Since the beginning of industrialization in the last century, a steady increase in energy consumption was observed with a growth rate of about 5.3% per year. The history of car-bon diaxide production from basil fuel combustion and cement production is related to the history of global energy demand; their rate of growth, at least before the energy crisis, was slightly less than 4.317. The fraction of CO2 emissions remaining airborne is amund 50%; ahlungh this amount is variable from year to year, if resulted in an increase of the atmospheric CO2 level by alvant 20% since the beginning of the industrial end The pre-1850 value is estimated to be 260 parts per nullion by solume (pqmy); ic was 290 ppmy around 1900 and the 340 ppmy value was exceeded for the lirst time in 1981 twhich represents roughly 710 Gronics of carbon as carbon dioxide in the atmosphere). If energy consumption follows current projections, it seems probable, based on present snowledge of the carbon cycle, that annospheric CO2 will increase to a level of about 380 ppmy by the end of the century and reach twice the pre-industrial level around 2050 A.D. or even 2080 A.D. 1Th. D. Potter, World Climate Program Newsletter, 4, 19831. This will inevitably lead to changes in the clinate system and present estimates cemer around a global average value of 2-3°C surface air temperature increase per doubling of atmospheric CO2 concentration, with a 3-4 fuld temperature increase in northern polar regious. However, due to the inertia of the breanic residence, temperature increases are expected to follow the CO2 increase with a ng of 10-20 years.

The NRC Report

In screening the existing knowledge, Cacbon Dioxide and Climate: A Second Assessment
(the report of the CO₂-Climate review panel
of the U.S. National Research Council,
chained by J. Smagorinsky of the Geophysical
Fluid Dynamics Luboratory), concluded that
previous results published in the Channey rejunt (Climate Research Board, 1970), which
inferred a relationship between man-made
changes in atmospheric compusition and substantial climate effects, remain unchanged:
"An increase of carbon dioxide in the atmosphere by a factor of 2 would cause the average global staface temperature to increase by
3 ± 1.5°C and no overlooked or underestiunated physical effects were found that could
reduce this currently estimated global warmlog to negligible propunions or reverse them
together."

This represe forware colored the climatologic

This report focuses only on the climatological aspect of the CO₂ problem and conclusions were drawn principally from the present-day numerical models of the climate system. There are 4 main chapters:

 Introduction and overview, dealing with some historical background of the CO2-climate research;

2. Principal scientific issues in modelling stidies, where the global climare sensitivity is analyzed from simplified models and empirical approaches; the role of the ocean in the transient response of climate and of sealine is discussed; the cloud effects are treated through the cloudiness-radiation feedback and the stratus-sealice interactions; trace gases taker than CO2 and annospheric acrossis are recognized as providing another potentially significant and complex source of climate variability; and finally the need for model validation, their current state and their

in provement are reviewed.

3. Predictions and scenarios of climate changes due to CO₂ increases, where the global-average, the zonal, and the geographic responses to scenarios of CO₂ increase are investigated not only through a 1-dimension radiative-convective model but also through comprehensive General Grentation Models of the joint occursation-phiere system. Various observational studies are shown to provide a useful starting point for diagnosis of rlimatic processes that may prove to be relevant to the CO₂ problem, but have certain problems and limitations that deserve comments.

4. Early detection strategies and monitoring at the ocean climate response, where it is suggested that early indications of CO2-induced changes can perhaps be found in zonal-mean summer temperatures in the stratosphere and mesosphere, in satellite remote comperature sounding data, in the temperature of the deep orean layers, in the weighter mean global mass integral of the annospheric emperature or in the sea-be extent, Howevet, the early detection of the COs-dimate signal requires not only a prediction of the C.Coinduced climate change but also a knowledge of the narmal dimate variabilities. Therefore, operational monitoring of the ocean and atmosphere is not only required but it is also occessory to determine from the pay dimptic records the variability of relevant chinatic var-

NRC Canchesious

In varianary, the panel reached the following conclusions.

(1) The sensitivity of global-mean temperature to increased atmospheric CO; estimated from simplified models is generally consistent with that estimated from more complete models.

(2) Edubal-mean cortact warming is driven by radiative heating of the entire surface-atmosphere system; land unface processes inseract with dimutic changes in wavy that are yet panels understood.

(3) The heat capacity of the upper ocean is

(3) The hear capacity of the upper ocean is potentially great enough to slow down substantially the response of climate to increasing atmospheric CO₂.

14) The lagging ocean thermal response may cause important regional differences in climatic response to increasing CO₂.

15) It is premating to draw conclusions regarding the influence of clouds on climate sensitivity to increased CO₂.

(b) The climain effects of alterations in the concentrations of trace gases can be substantial.

(7) Atmospheric aerosuls are a potentially significant source of climate variability. Into the climatic impact of their changes caused turrently be determined.

[8) Comparisons of simulated time means of a number of climatic variables with idiscr-

vations show that modern climate models provide a reasonably satisfactory simulation of the present large-scale global climate and its average seasonal changes.

[9) Observed surface temperatures of Mars, earth, and Venus confirm the existence, na-

ture, and magnitude of the greenhouse eflect.

110) Model-derived estimates of globally, and perhaps zonally, averaged temperature

ges appear to have some pro

bilty for a prescribed CO2 perturbation.

[11] Observational studies play an important role in the formulation and the general validation of models, the construction of climate scenarios, and the determination of the natural climatic background against which a CO2 man-induced climate change will have in be tested.

In the frame of its conclusions, the panel has come to recommend the following research and action:

(1) Theoretical and empirical studies of the climatic effects of increased CO2 must properly account for all significant processes involved, musbly chatges in the tropospheric energy budget and the effects of ocean storage and atmospheric and oceanic transport of beat.

(2) Empirical approaches to estimating dimatic sensitivity, particularly those empiricing satellite radiation ludget measurements, should be encouraged.

(3) The role of the ocean in time-dependent climatic response must receive special attention in future modeling studies.

(4) Future effects should be directed toward the further intercent of the parameter.

ejerizations of physical processes that are

poorly intelestand at present, i.e., chard formation, moist convection, and land-surface

(5) The most radiatively significant trace gases must be monitored.

16) The choosis impact of changes in authorogenic acrossels must be better deter-

(7) A comprehensive dimate model salidation effort must be pursued.

(8) Further analyses and diagnostic studies based on past and contemporary climatic data sets should be encouraged.
19) A set of indices that have a large signal-

n-noise ratio with respect to CO2-induced changes should be identified and unminted. [10] CO2 transient response experiments and CO3 cloate equilibrium sensitivity experiments must continue. The investigation of the transient response from occausationsphere general circulation must be pursued.

(11) To determine the geographical details of a CO2 induced climate change, it would be necessary to develop climate models with improved computational resolution.

This very clear report, scritten in a concise formar, provides not only an excellent view of the most recent results on the CO2 impacts or climate but also analyzes critically the fittinations of the present models and observation data cet. Accordingly, the expects of the panel concluded with recommendations which are going to be landmarks for research in the luttine.

A Douader Lauk

The Long-From Topocts of Increasing Atmosphere Eurlon Provide Leich, erlited by G. J. MacDonald, is much broader in scope than the National Academy report: it does not limit inself to charactering report: it does not limit inself to charactering report: it does not limit inself to charactering report does do charactering resulting from rhanges in the chemical composition of the atmosphere (part 2), some consequences of changing the composition of the atmosphere and research neede (part 3).

In fact, the book is built to document the following datement up axim: "Stave carbon choule is transparent, or almost so, to suralight but absorbs energy radiated by the earth in the infrared part of the spectrum, carbon choose plays a key role in determining the mean temperature of the atmosphere, we variation with height and lawfine, and thus the dimate of the earth. Carbon dioxide care also after the rate at which playts grow and stone carbon. Reacting only water, carbon throwde can change the acidity of ricers lakes, and o cans and prosibly perturb biological activity."

Significant uncertainties exist in the four main aspects of the CO2-dintage problem: (1) the rate of CO2-production, both manual and man-nucle (the latter by an increasing energy consumption the to improvement of life conditions and expansion of world populations; (2) the impresse of annosphetic CO2, which is related to the carbon vycle: (1) the modeling of the climate, and (4) bioxphere response to clanges in amosphetic (3)2 concentration. The possible benchrs and costs of these changes in society billy justify the need for such a look, which considerably helps to here

ter understand the overall CO2-climate model and its weaknesses.

Chapter 2 discusses the contribution to atunsuberic carlson dioxide due to the hurning of a wide range of natural and synthetic Inels. The values listed must be used with caution as some more efficient land uses produce less amount of carbon per unit of thermal or electric energy generated: a conventional. coal-fixed electrical power plant releases 5 times as much earbon as natural gas dues, symbotic gas and oil roughly 3 times, and natural shale oil and coal around 2 times. (methane releases 13.8 kg rarbon per 10°] more or less the same as thies hadrogen from natural gas reformingt. Future fueluses are then estimated to movide a base for houre amospheric levels of carbon dioxide. Unfor finalely only two conservative scenarios are considered: (1) with the present fuel mix. 1400 additional Gronnes of mation will be deposited to the 1978 atmosphere by the year 2035 if the historical growth rate is maintained; (2) with a tapeted growth rate thistorical growth rate nationalized to 1990 and then decreasing linearly to zero over the fifty year period 1990-2010), the date is pushed forward 20 years. A comparison with much more efficient scenarios, ac described in Bach (Progress to Phyweid Geographs, 661), 549-560, 1982), would have been of real interest; for example, by the 16 TW Commission of European Communities wenario, the consulative carbon emitted into the atmosphere since 1978 would be only 350 Gronnes by 2005.

As the terrestrial and marine biosphere act as a source and sink for carbon doxide and as the curbon excle is closely compled nemature or the oxygen cycle, the following mattery are then reviewed in chapter 3: the response of nanual vegetation to increasing at mospheric CO) ralso in chapter 13), the effects of deforestation grosion, the endiroplacation of the ocean; the oxygen balance sheet, the minor reactions contributing to the oxygen cycle and oxogen in the ocean reg. matural except deligit of the oceans not only amounts 3000 Coprotes for is increasing at a rate of 10 Goornes of usagen per year which remains to be explained through direct and indice) effects of human activity)

The rate at which the ocean can absorb cathen diesale, depending on low the surlate tayers of the ocean mix with the deeper pairs, is simulated through the Pipe Model which emphasizes the physical biological, and themical processes at the ocean boundaries, are interesting hydrodynamic mixing alternative to the more usual diffusive box models.

Estimating Fution Levels

For estimating the hante levels of CD2, a model of the atmospheric biospheric occanic interactions is presented in chapter 5, where the importance of the biospheric and oceanic uptake of curbon and the possible feedback. from large varboic reservors are illustrated. The dates on which the carbon dioxide content doubles range from 2003 to 2005, despending on the assumed absorption apacity of the oceans and biosphere and whether the carbon-based fuel courribution grows at a Go

T. A. Potemra, Editor

Books (cont. on p. 5

RELEASE

Geophysical Monograph 28

MAGNETOSPHERIC CURRENTS (1984)

MAGNETOSPHERIC CURRENTS \$33 illustrations • hardbound • 375 pp.

The 37 papers in this volume are of value to scientists and students who are interested in the electric currents in the earth's and other planets' magnetospheres. The present research data in this field is thoroughly consolidated and summarized and remaining questions are highlighted.

Chapter Headings

• Early History
• Introduction to

Magnetospheric Currents
• Surface Observations

Near-Space Observations
 Near-Space Observations

• Disiani Space Observations • ionospheric Effects

• Theory and Models
• Plasma Instabilities
• Current Systems In Oilter

Magnetospheres

Wrile: American Geophysical Union 2000 Florida Avenue, NVV Washington, DC 20009

accepted

Call: 860-424-2488 (202) 462-6903 (in DC) area ch buiside configuous USA) Wire: Western Union Telex 710-632-9300

Orders under \$50 must be prepald AGU members receive a 30% discount

Martin and American

...............

To Do Today

Call AGU

at 800-424-2488

Order books/journals

Request membership

Register for meeting

Place advertisement

Change address

applications

in Ex

Books treat from p. 53)

pered rate and the present fuel unix is mainiannel. But, given the large uncertainties involved and out the two energy scenarios. used, 2035 appears to be a reasonable estimare, which is definitely at the pessimistic side when compaired with the niore recent projections of about 2070. Furthermore, a worldwide warming will tend to produce a positive feedback releasing ration from the ods, methane hydrates, and the organs, although there remains uncertainty as to whether these large carbon pools will play a significant role in enhancing the L3 fain-

almed churste charge. Chapters 6, 8, and 9 review the fundamentals for significance changes in the infanctory. heat balance from chemical changes in the atmosphere, considering models of the atoursphere in which radiation is the auth merhamonths which energy is transferred. The rquivalent quasignas radiatire atmosphere give a $\Delta T_{\infty} \approx 2.8$ K at the LCD content were rlombled. A zonal energy balance model and a simple band model for infrared emission from the terrestrial atmosphere show that the AT Treatback from the additional water burden that the annosphere can support in maintaining a constant relaine humidity, is comparable to the ΔT produced directly by authorease to COs. This illustrates the impersone of the water sapor feedback which was dearly demonstrated in Ramanathan (Januari Armosphere Serence, 1864), 918-4501. 1981). The pointry contribution to the $\mathfrak{g}(\mathbf{x})$ 1.05) surface warming (2.27) is indeed from the enhanced tropospheric IR emission due to the increased evaporation from the warmec occao in a C. Gride atmosphere (1.7°C). Thicks an order of magnitude greater than the direct City radiative heating at the sur-Tace (9.17°C), the third process involved being related to the downward component of the amphilied atmospheric TR emission.

The addition to the atmosphere of minor constituents that absorb in the 8 to 12 km. band could also be important [chapter 7): Au increase of 100 mass would place the beons in the characteristical entergone; for both artroncoside and methane, which sit in regions where there is already strong absorption, lartors of 2 are important. Although innertantnes do exist in the strength of lutine sources. in the atmospheric elemnistric and in the asmosobern Teedbacks, an additional 1.5 K increase in average within elemperature is annonned in the mid-21st century as a result. of an increase by a factor of 2 in CIT cipins duced mainly from the anaerobic becomenianon of organic material: 0.4 Kt. 1.5 in N.0 to securally time to the use of ammorpa based terubrers, 0.4 Kt. 10 in Treors (0.1 Kt. 1.5 in CCC), by positive of the incomplete combins non of hadrocarbor fuels: 0.6 Kt and 15 m Chefurnaly released from the electrolytic reduction of alcomann: 0.1 Kt

Howan Impacts

Finally, part 3 is desorted to some particularly important consequences of man's impacts on the composition of the annosphere. After a shore discussion on the use of models to product climate phapter 10t, the latitudes dependance of the changing temperature is discussed (in chapter 11) with its effects on the distribution of sea-ice and, as a result, on the ocean circulation aurt on the marine bigsphere. For example, an increase of the arerage ocean temperature hs 4°C would ultimately release about one-seventh of the presently dissolved 1.Oz content of the amosphere and a polar. CO:-induced warming will probably weaken the deep water

primps, abliongly to sensitivity remains very band to pasess The impact of the warming on the most

subscrable part of the Antarctic ice mass, the West Antarctic are sheet grounded below sealevel, is their consulered in chapter 12, a useful reciew of the basic physics of ice flow and creep being given in the appendix. On the basicol cery simple mechanical consideralone the creejothinning of marine-based ice. streams rould be last enough to than down the we store may hade as 100 years, buy the question of whether a polar warming due to COrdonbling could remove we shelves sufficirculy to initiate with rocchanical desiring to tion has no clear answer at the moment, but medis attendon beranse of other cruddal. excits triggered, namely the 5 maise in sea

Finally, an improse to the CO2 content of the ausosphere will im rease the carbon that is asadable for lexation by playeesinthisis and change the church conditions, both changes altering net paintary productivity. The monclineate affects of LLDs as a mutient of agrientiurat and seatmal plants may be at least as important as the flurant effects and iceds better attention. For example, in addition to its possible effect as a fembles, the CDs produced by fossil fuel burning may also be belping to the rease ageicultural yields in teducing the water demand of corp plants in

Assummary ends this buildent lank by tre-

(i) the role of the bisophere in the carbon cycle in g, more detailed statistical analyses ting observed climate changes are required before the impact of climatic change in the here can be predicted).

12) the role of the soils and hydrates of

(3) the role of climate models, intermediate in complexity herween heat budget models Iwhich cannot provide the details on the climatic parameters which are essential in assessing the long-term impacts on activities such as agriculture) and the global circulation models (whose complexity may hide the midedjing physics and which related numerical ition employed may distract the ig-term interactions).

(d) the timing and place where rise in near temperature will occur Ismumer or winter. night or day) and its effect on local extremes, 15) the ellint in monitoring trace consituents which can enhance the greenhouse ef-

16) detecting the secular temperature (repl against the noise background, and 17) the carlilwide nature of the CO2 ques-

Although the climate system pussesses many resilient qualities, man's activities may well after greatly the future climate and in consequence our society itself. It therefore behouses us to not let this experiment, the greatest inadrertent genphysical experiment erer begun, proceed unabserved and uncontrolled. These two looks will amboubterlly help multidisciplinary interchanges among the overall community involved in this COs problem. Read them.

A. Herger is with the Institute of Astronomy and Geophysics G. Lematter of the Catholic Conversity, H-1 VIS Longroin-la-Neure, Belgium.

Seismic Reflection Interpretation

A. H. Kleyn, Applied Science, New York, xii + 269 μp., 1983, \$57.50.

Reviewed by Larry D. Brown

This interesting, allieit inneven, little brook reviews a broad range of topics related to the collection and analysis of seismic reflection. data. In spite of its misleading title, it deals less with the geological interpretation of re-Hection sections than with the geometrical analysis of seismic caypaths. For example, statos corrections and migration theory-Impies or peripheral interest if not indifference to must interpreters—are subjects of entire chaptery while seismic stratigraphy, one of the hostest current branches on interpretaion, is unt exen mentioned!

Title semantics aside, a glame at the table of contents confirm that most of the obligatory topics of an orecview are covered: An introduction (chapter 1, brief to the point of extinction[] is followed by a "Review of flasic Principles" [chapter 2] in which refraction, rellection, diffraction, Snell's Law, Fermat's Principle, Fresnel zones, reciprocity, saapling theory, trarel-time curves and f-k filtering are suriously, though curtly, discussed, chapter 3, "Geometrical and Analytical Backgrounds," gets to the cay tracing considerations while lie at the heart of this book, deriving time distauce relationships for reflections and refractions in layered and continuous media as well as discussing CDP data collection technique, NMO and velocity analysis, and multiple reflections and areal surveys. "Static Corrections" are the subject of chapter 4, and chapter 5 [Reflection, Transmission, and Acoustie Impedance), reviews basic concepts Sucluding a discussion of the convolutional equation for acoustic impedance in porous nedia. Chapter is ("Velocity Measurement in

model of reflection response and Gassman's Wells") debres into well logging and its rela-tion to seismic sections. Chapter 7 ("Structur al Interpretation of Reflection Information"; attacks the meatier topics of inigration geninetries in 2 and 3 dimensions, including timeto-depth conversion, and is supplemented in chapter 8 ["Elements of Signal Migration Systems") by a review of Kirclinff and finite ele-

ment approaches to computer migration. The lunck's primary appeal lies in its fresh been either argletted or inadequately addressed in other texts. The flavor of industry experience enhances many of the treatments The frequent incorporation of 3-dimensional considerations in discussion of analytical and processing procedures is reprelably welcome, although the 2-D diagrams are among the most coollasing in the book, and the vector notation is aloughly introduced. The treatment of reflection time derivatives, examples of spin sons tex orbitions from such phenumeus as reflected diffractions, time fies at line r rossings, and the relationship between the various types of velocity measures are particularle insightful. Some relatively minudance topiks like NMO stretch also receive an onrestal airing. The overview of well logging is well done, with a discussion of well shooting as well as accussic lugging. The treatment of inignation and structure is particulary thorungh with respect to the geometrical aspects, List price including neigration of time combur maps and 3-D data with the usual examples comparing unningrated and infigrated restorates of basic structures. A discussion of migration before stack in chapter 8 also deserves mention. An especially useful aspect of this book is the linclusion of minerous exercises with solutions (referred to in the book as examples). Hissel

AGU BUILDS ON ITS REPUTATION FOR VALUE WITH **THESE 1984 JOURNAL PRICES**

Geophysicai Research Letters

Editor-in-chiel le James C. G. Walker, Space Physics Research Lab, University ol Michigan

Same price es last vest \$22 (U.S.) \$27 (Non-U.S.)

Gaophysical Rasaarch Lattars Is published monthly. GRL contains reports of the latest research geophysics—papars ara published 9 to 12 waaks after recalpt of manuscript. GRL has only peer reviewed papers, with full author and subject indexea at veer'a end.

TO PLACE YOUR 1984 SUBSCRIPTIONS TO EITHER OF THESE JOURNALS:

WRITE: American Geophysical Union 2000 Floride Avenue, N.W. Vashington, DC 20009

WIRE: Western Union Telex 710-822-9300

Reviews of Geophysics and Space **Physics**

Ediled by James Heirtzler, Wooda Hole Oceanographic inatilution, and Andrew F. Nagy, University of Michigan A 35% aevings over last year \$18 (U.S.) \$20 (Non-U.S.)

This journal, published quartarly, containa papers that distill praviously published scientific work in currentactive areas of gaophysics and space physica.

Now all mambara can afford to hava Raviaws of Geophysics and Space Physics in thair parsonal rasearch Ilbrarias. This Union-wida journal of pertinant raview erticles has bean specially pricad.

CALL: 800-424-2488 |202| 452-8903 flocal OC area or outside the conliguous USA]

problems are unusually fresh and often more informative than the accompaning text. Also particularly handy are the numerous bibliographical references at the end of each secin, although the use of volume numbers in lieu of page numbers is annoying. Lastly, the numerous seismic sections Humped, for some unexplicable reason, at the end of the book rather than inserted where they are discussed) are excellent and exceedingly well re-

produced. Unfortunately, the treatment of many of these topics is oneren and often sketchy. According to the preface, the book is based on a series of inclustry lectures, which may account but the frequent impression of that une is reading supplementary notes rather than a fleshed-out text. Many of the basic relations are briefly derived, if at all, and important equations often appear with "it can be shown than-type introductions. Although this brevitr may have been an intentional efort to skirt introductory material which can be found elsewhere, the resulting incompleteness will impede readers not already familiar with the material. Many of the figures are unnecessarily confusing, usually because of poor annotation and incomplete discussion. To cite but one example: Explanation of how multiple channels are used to collect data in the CDP roll-along manner is relegated to a single, confusing figure of a stacking chart that would baffle anyone not already aware of how roll-along works. There are no true synthetic seismic sections Jouly travel-time sketches), although they would prove most informative in illustrating many of the principles. While such explanatury omissions might be acceptable when addressing an experienced inclustry audience, they seriously detract frum this book's utility as a general pur-

Another detranion is the uneren and often curious emplicasis of topics. Statics corrections are given a separate chapter, while all rather aspects of seismic data processing are himped under a background chapter. Even the discussion of statics is uneven; Much residual statics barely rates a mention. Resolu-

tion, decurvolution and and assis arcuration are also barely mentioned. Although refraction is discussed at length, the traditional basic equations for interpreting thicknesses and dips in layered media never appear, except implicity buried in less useful througher incer-

incomplete. For example, after expending ious relacity measures, the malain sixually skips through a dispension of the various tion aspects, without a clear explanation as seismie data processing are addressed, the limited points. Most of sections exhibit a of much more discussim.

AMERICAN GEOPHYSICAL UNION PUBS-A-GRAM S

0

0:

Need to order Groundwater Hydraulics (1983), o edited by J. S. Rosenshein and G. D. Bennett. Latest edition in the Water Resources Monograph Series.

O The 17 papers in this state-of-the-art monograph cover a broad range of hydrologic problems that are of immediate interest to the theoretician, academician, and applied hydrologist. The principal subject areas examined are aquifer hydraulics, heat and moisture O | transport, and modeling.

List price is \$18 - 30% discount to all AGU members. O Orders under \$50 must be prepaid. Call 800-424-2488; or In DC area, 202-462-6903. accepted.

pretation viewpoint) emations. Even the more landable discussions seem

considerable worthwhile prose describing varmethods for making such measurments. showing no examples of the most commonly used techniques such as velocity spectra. The computation of parious sine derivatives which I found rather elegant, is left hanging with no real attempt to point our their physical meaning or usefulness. The problem of vertical time-to-depth conversions seems to me to be innecessarily entangled with migrathe relationship. There is not aiguition of frequency domain migration although an entire hapter is dermed to Kircholl and finite difference methods. Although several aspects of treatment is too scattered and incompelete to provide a useful overview of this aspect of reflection seismalagy. In spite of their excellent quality, the appended seismic sections are little discussed, except to illustrate a few rather number of interpretational principles worthy

Although this book attempts to cover much of the methodology of the reflection seismofogy, it is too sketchy and uneven to serve alone as an introductory or reference text. Yet its treatment of selected aspects is too useful and navel to overlook. As a supplementary or perhaps refresher text, it is worth . the attention of even experienced exploration

Larry D. Brown is with the Department of Geological Sciences, Cornell University, Ithaca, NY 14853

Posttions Wanted: hirst inscribin \$2,100, addition-Student Opportunities: liest insertion free, addi-tional insertions \$2,00. There are no discounts or commissions on classified ads. Any type style that is not publish ec's choice is charged at general advertising rates. Eur is published weekly on Tuesday. Ads must be received in writing by Monday, I week

prior to the date of publication.

Replies to ads with law mutthers should be addressed to Box ____, American Geophysical Union, 2000 Florida Acenne, N.W., Washing-For more information, call 202-162-6903 or toll free 800-424-2488. POSITIONS AVAILABLE

Portdomoral Fellowship: Hydrogeology. Applica-tions are invited for a postificational position at the University of British Columbia, Starting date: July University of Braith Calambia, Starting date; July 1, 1984; iwn years, with passible extension for a third year. Specific research task will require familiarity with hydrogeologic environments, contaminant transport, and monerical modeling. Open to candidates from Genburgt or Engineering, Sahary: aleast \$29,700 Canadian. Applications with resumes and addresses of three referees should be sen by

Research Position in Space Plasma and Auroral Physics. Two research positions at the level of assistant of associate research scientists are available in the Department of Physics & Astronomy at the University of lower for qualified candidates with a Ph.D. degree and experience in space plasmas and/or antrotal physics. Present research in space plasma physics emphasizes analysis and unterpretation of observations of a superconstructions may be a characteristic and any magnetic phasma may may be a superconstruction. roral physics. Present rescarch in space plasma physics compliastics analysis and interpretation of observations of magnetospheric plasmas mong magnetospheric plasmas mong magnetospheric plasmas mong magnetic magnetic plasmas mang magnetic plasmas mang magnetic plasmas mang magnetic plasmas magnetic plasmas magnetic plasmas plasmas plasmas and magnetic mondet and control magnetic plasmas plasmas and also administration of the appet and observations are also available for other areas of research including the plasmas of the upper annotation. The applicant should identify and describe areas of his or but experimental or throughout which can support experimental or throughout moral physics. Salary and position will be desermined by the applicant's qualifications and experience

position will be determined by the applicant epidemic facilities and experience. A resurve and the names of three persons knowledgeable of applicant's experience a should be low-warded to: L. A. Frank, Department of Physics & Astronomy, University of Jowa, Van Allen Hall, heart Coulombia.

Dr. R.A. Freeze, Department of Geological Sciences, University of Braish Columbia, Vancouver, R.U., Canada, VIT 2R4, For Jurther information, tele-

The University of Jowa is an attermatice action?

Classified

Portions Available, Services, Supplies, Courses,

and Aunountements: first insertion \$5,110, acl-

RATES PER LINE

al insertions \$1.50

ion, DC 2000ly.

ditional insertions \$4.25.

Program Manager/Alr-Seo Internation. NASA lleadquarters' Oreanic Processes Branch is seeking candidates for planning, devrloping and implementing a scientific research program utilizing satellite techniques in the general area of an escalable scancrometry to characterize the surface wind field, and the effect of surface winds on upper-ocean currents. Qualifications include 1) ability to communicate effectively, 2) demonstrated experience in conducting original research, 3) program management experience, and 4) knowledge of physical oceanography. (5) 14/15, with salary ranges from 541,277 for \$63,115, commensurates with experience/education. raphy. GS 14(1), with solary ranges from street e-\$63,115, commensurate with experience/education. For further information regarding requirements and application procedures write to address below or phone 202-755-3687. Formal applications must be received by Mar 6, 1984. NASA Hearlquarters, Code NHP, Washington, D.C.

An equal opportunity employer.

University of Oklahoma/Electronica InstrumeOn-tion Specialist. The School of Geology and Geo-physics is accepting applications for a full-time Elec-tionics Instrumentation Specialist. Principal respon-sibilities will include maintenance, calibration and stratures with include manufestatic, car-user instruction for a new, composer-at Rigaku XRD-XXF system, and mainten user instruction for a new, composer-automated Rigaku XRD-XRF system, and maintenance and repair of electronic components of other lab facilities in the School. Additional apportunities could include involvement its the University's electron microscopy lab (SEA) and TEA), and the development of a Vars de Grast-PIXE analytical system in rullaborations with O.U. physicists. Applicant should have a B.S. in Geology, Chemistry, or Electrical Engineering or equivalent in experience; salary is commensurate with qualifications. Send curriculous vises and names and addresses of three putessional telectenes to:

references to:
 Dr. David London
 Schwel of Geology & Georghysics
 University of Oktahoma
 Nurmant, Oktahoma 7:3010
 Deadline for applications is March 15, 1984.
 The University of Oktahoma is no affirmatively of the property of the order of the o

Asslatant Professor of Geophysics/Purdue University. The Department of Geosciences, Purdue University authopates an opening for a new tetture back position at the assistant positessor level in the area of exploration geophysics. The successful applicant must be prepared in assist in teaching exploration geophysics courses, advanted topict in his/het specialty and demonstrate an ubility to develop and conduct productive research, Pustdonoral or industrial experience is desirable. The geophysics programs in the Department of Geosciences at Purdue University currently consist of four full-time geophysics faculty. Field and laboratory equipment and tacilities are oralitable for application to seismological and potential field geophysical methods. Excellent computing facilities including a typer 205 computer operated by Porduc University and mini-computers within the Department of Geosciences are paters within the Department of Geosciences are

Send letter of application including brief descrip-tion of research interest and goals, resume and

names of three reference to:
Don W. Levandowski, Deportment of Geosciences,
Pardue University, West Lafayette, Indiana 47907.
Closing date for acceptance of application is May
1. 1984 or until the position is filled. te University is an equal opport mative action employer.

Clay Mineralogy/University of Illinols at Urbana-Champaign. The Repartment of Goology invites applicants to a counce-toack launity position in a lay mineralogy. We are seeking ramiliates who have clearly demonstrated the potential to be outstanding researchers in the general areas of unineralogy, (128-tallography and chemistry of clay minerals, in the urigin, diagenesis, and measurophism of a gilla-cents sediments and whose Induce research will complement our existing programs in the petrology and diagenesis of rediments, experimental studies of compaction and of kinetics of burder diagenesis, be-havior of clay minerals during deformation, petro-leum genlogy, and stable isotope genchemisty. In addition to the development of a strong research program, the nacessful candidate is expected to

addition to the development of a strong research program, the uncessful candidate is espected to participate in all aspects of feaching and advising at the graditate and undergoadrate levels.

The Department of Usedogy houses a sariety of ladilities for day uthoradogy feace, the including x-ray diffraction and thorescence units, an atomic absorption spectrophonometer, two NAIR spectrometers, an isotrope-ratio mass spectrometer, and electron mic approber. Numerous other analytical services are available on campus, particularly at the Materials Research Laboratory where there is equipment for Anger electron spectrometry, x-ray photoelectron spectrometry, x-ray indioelectron spectrometry, x-ray indional microscopy, many contents.

ion nicroprobe nadies.

This position is available immediately. PhIL is required. Rank and salary will be commensurate with experience and qualifications. For equal consuleration, please submit a latter of application that includes a statement of current and latter research interests as well as a curriculum vitae, bildiographs and the names of at least 3 references willing to continent on your qualifications and promise by April 1, 1984 to 10, Albert V. Carozzi, Chainnan, Search Committee, Repartment of Licology, 215. Natural History Uniding, 1201 W. Green Street, Orbana, 11, 61801. Phone 217/233-3088.

The University of Illinois 217/233-3088. domative action employer.

Research Position/Department of Oceanography, University of British Columbia. Recent Pla11 with experience in statistical methods and geophysical thrid dynamics sought to participate in the analysis and interpretation of data from an array of exclessonies (profiling current meter, 1.11) systems and current meters in the Strait of Georgia. The cambidate should also have the potential of modeling the observations in review of the modeling the observations in review of the modeling the observations in review of the modeline low frequency motion of a straited third of variable depth. The position is available, so I I November, 1984, for a duration of one wrat and may be resewed for a second year; it will be filled at position to 327,000 for especial associate tup to or \$27,000 level are orthing to the candidates experience. In accordance with Ganadian muniquation requirements, priority will be given to Canadian observed and three leners of reference should be sent 1 July 1984 to Th. S. Pond, Dept. of Dreanography, 6270 University Blyd., Vancouver, B.C. Langaphy, 6270

University of Kentucky. The Department of Lecologi mynes applications for two frame rank Lacular positions. Areas of specialization are 1) beophysics, 2) Structural or Tectoric geophysics geomathematics or perfoleoin geology. It is among and that both positions will be filled at the level of Assiant Professions will be filled at the level of Assiant Profession. smons will be filled at the level of Assiant Professor but applications for a more senior person will be considered, begree of Ph.D. is required. The Repartment awards Bs. MS, and PhIt degrees. The starting rank and salary depends on qualifications and experience—either industrial or

Rentents of application should include a full comulum obar,a statement of intent regarding research, names of three referees, and should be addressed to: Or, Nicholar Rast, Ubairman of Search Commuo: Or. Osennae Rasi, e narman of Scarch Commis-ce, Bownian Hall, Rosmi 255. University of Ken-ucky, Levington, KV 10503-4050, (606) 257-15222. DEAD/AVETO: application is APIIII, 15, 1984. The University of Kentocky is an alternative ar-

Seismologist/Virginia Polytechnie Intilute and State University. The liepartment of Geological Sciences at Virginia Tech invites applications for an additional tenure track luculty appointment, at the junior level, in Reflection Seismology, Research La-cilities include a complete VIDRI SEIS-48-thanourl seismic data acquisition system and a deducated VAX 11/780 computer using DITGCON IUSCO solutions.

soltware.

Applicants must demunstrate a strong creent herefrence will be given to those with experience in the theoretical and observational aspects of reflection seismology. Faculty members are experted to teach at both the undergraphone and graduate levels, supervise M.S. and Ph.It. Shees, and conduct an active research program.

Applicants should send a creame and the names and addresses of three referres to:

[A. Snoke]

and addresses at three referees to:

J.A. Stoke

Department of Geological Sciences

Virginia Tech

Blacksburg, VA 9-4061

The appointment will begin September 1984 and randidates are expected to have completed requirements for the Ph.D. by that time. The application documents for the 18-10.

Virginia Tech is an equal mpps

Mineralogical Society of America. Applications are invaced for the position of Executive Secretary. The MSA Executive secretary is the member of the staff of the American Geophysical Union in Washington, D.C. who is responsible for managing the business activities of the Society. Tunies include invaluence in activities such as membership, acromment business activities of the Society. Tunies include involvement in activities such as membership, act outing, publications, subscription Infillment, act outing nrrangements. Scientific, management, and/or
publication background is desirable; dedication, or
ganizational ability, and some knowledge of computer record management are essential. Salary from
\$23,000 depending on qualifications and experience. Send resume and names of three references
to: Mineralogical Society of America. 2000 Florida
Avenue, N.W., Washington, D.C., 20009.

Pacolty Postton/University of South Alabaman. The Department of Genlogy and Geography is seeking to fill a tenore-track position at the Assulant Professor level, beginning September, 1984. Applicants should hove unjor training and experience in geological application of remote sensing, and some phase of economic geology. The Ph.D. degree is required. This is o growing department with a present full-dime faculty of five geologists and for geographers and approximately 200 majors. Please send returne and arrange for three letters of reference to be sent to: Dr. Glerin R. Sebastian, Chairperson, Department of Geology and Geography, University of South Alabama, Mobile, AL 50088. Applications should be sent behave May 15, 1984. The University of South Alabama is an equal upportunity, affirmative action employer.

Postdoctural Position/Dalhousle University. A powerar position in the Oceanography Depictorian is available for a person interested in marine gentialists. Specific work involves participation in them flow studies a ross the margines of easiern Canada but broader opportunities also exist for self-motivated properts within the Concerns or at Redford Institute of Oceanography. A Prill. in geophysics and desire to work 1-2 modyr at sea are required. Experience with hear flow helpful but and revential. Send U.V. and tames of two references in: He.K. F. Londen, Dept. of Oceanography, Dalhouar Phiversity, Halifas, NS, Canada, B 91-Q1.

Research Associates. The Department of Farth and Space Sciences at SUNV Story Brook profes Research Associates. The Terrament of rain and Spart Sciences at SUNY Story Brook Invites applications for a Research Associate position. Cambridges should be experienced in application all Flection Microscope techniques to geologic materials. The Department has a JCOL 2000. The from Microscope with EBS and will be purchasing a new Flection Probe in 1981. Hories will include equipment maintenance, moving tion of graduate students on equipment was and research both independent and in computers with the interest of proportion and in computers with the interest and research both independent and in computers with the graduate for the proportion of the proportion of the second difference of application, resume and natures and addresses of three references by March 31, 1983 to 197 Steven Roblem, Department of Farth and Space Survices, SUAY Story Brook, NY 11791.

SUNY Story Brook is an equal opportunity affinitiative artificial captions.

NASA/Space Plasma and Magisetospheric Physics. This is an opportunity to become involved in state-ci-the-art data management issues, to be impress and solutions while simultaneously put string research interests. The National Space Science Data Center at the Goddard Space Flight Lenter is in an exching transformal period and has three to wropetings of its contact stall for data oriented space alsona, and magnetospheric physics is Cheese indingy on its contact stall for data oriented space plasma and magne to place, plasse is S. These indi-cidinals will join with several others in articlying a broad range of activities, primarily invended to ta-cilitan access to and utility of space settince data in an evolving technological custormical. These activi-nes in hide developing it of an ordine data catalog, interfacing with Principal Investigators and space-tral project offices for data arresidulity and documemarion, preparing data catalogs, generating tech inques for conditioned undisspaces all data arquis non and analysis, and generations of composite or other value-added data sets. Research impresss are encouraged and may be pursued on a substantial part-time basis. A Ph II, is prefetted, although a Master's degree will be consulered, for some activi-

orance s negree with spare flight experiments, data analysis trelutiques, that presentation, publications, and programming is highly desirable. Specific clothes will depend upon an imbaduals barkground and

Signa Data Services Corp., a M/A-COM Un Code 601 National Space Science Data Center NASA/GSFC Sigma Data Services Corp., a M/A4 CM Co. is an

Upper Atmosphere Research: USRA VIshing-Scientist/Research-Associate Program at NASA Morshill Space Flight Center. The Universities Space Research Association (USRA) incides applications for a research position in its Visiting-Scientist/Research-Associate Program at NASA Marshall Space Flight Center. Themswille, Alabama, in the Atmospheric Sciences Iricisom of the Soucius Bynamics Laboratory. The research will consist of theoretical studies, class analysis, and modeling of the carth's neutral atmosphere above 70 km alcutule in collaboration with NASA/MSEU vientists. While we particularly seek applications from recent graduates with the Ph.D. degree in atmosphere science, or a related distripline, consideration will also be given to holders of the Mastery degree with appropriate experience. The appointment will be for one year trenewalile); salary is competitive.

Applicants domited whom a comprehensive restinct and manes of three references to D. M. 11. Ups. USRA, P.D. Boy Jino, fundler, 151 80347.

CSRA is a non-grotal consortium head-pointered in

OSRA is a non-profit consortium headquartered in Galumbia, Marsland, sponsored by NASA contract The Association is an Topal Opportunity/Albrota-

University of South Alabama. Faculty Position. Tenutry-track position at the rank of Associated Processor in one of the two following fields (1) Incertesticate Paleonfology-Stratigraphy, 12) Igneous CR Metamorphic Petrology. The University of South Alabama has approximately 10,1000 students, and is located in a growing metropolitan area. The Hepartment of Geology and Geography has approximately 20th majors, and a facility of une full-time and three partment in index. This position is to be filled common using September, 1983. The dearline for applications is May 17, 1981. Please submit letter of application, along with a resume of control of application. The protection of Control Control of South Alabama Mobile, Al., 20088. Also arrange to have at least three letters of reference and to the same address. The University of South Alabama was an equal opportunity, affirmative action employer. portunity, affirmative action employer

University of South Alabama, Enculty Pusition

Faculty Position/Florida Atlantic University. The Physics Department is soliciting applications for an experimental physicist in a terroric line position at the Assistant Professor level to guining August.

Vandulates must have a Ph D, degree and have demonstrated a communical to research and teaching. Problems will be given to candidate with experience in experienceal atmospheric physics, op-

Res, of solid state physics.

Salary wenegoviable: Dradhine for applications—
April 1, 1984. Contact Dr. Bjorn Lomborn, Chair-man, Department of Physics, Florida Atlantic 1 in-versity. Bura Ration, 17, 33431. Cc1 (305) 304-3381. Horada Adamo Caro rate is in all motive as

Colgate University. The Department of Coology Colgate University. The Department of Goodey at Colgate University annoyanes one of more openings in the teaching Loudin beginning in the Lab of 198 t. These openings may include a following appointment ten wable for a maximum of three wears at the assistant professor level (Ph II repured). A second position at the institutor level would invoke primarily laboratory teaching. One position must be filled by a randithree capable of teaching inderignal units overnographic andor physical geology. Areas of bursher expective are presently less restricted and could rinkiele any of the following disciplines: Fediogr. Charal Geology, Highrogulogy, Ormaniphology, Charal Geology, Highrogulogy, or Marine Geology.

ology.

Applicanty should submit it some and the mains of addresses of three relationes in Rr Brice Scileck. Repairment of brodogy, y olgane University, Hamilton, NY 1334b. Closing date for applications

Colgate University is an equal-opportunity affirmative action employer and especially invites applications from women and minorities.

THE UNIVERSITY OF ADELAIDE Invites applications from both man and woman for the following position: POSTDOCTORAL FELLOW IN APPLIED GEOPHYSICS

South Australia

(FOR MATHEMATICIAN, PHYSICIST OR ENGINEER)

In the field of Airborne Magnelic Surveys. The position will be in the Dapartment of Economic Geology which will be amalgamated with the Dapartment of Geology and Mineralogy in 1985, to form a single Department of Geology.

The appointee will participate with Professor D. Boyd and a small research group in the development of a practical system of computer aided interpretation of digital external data which is being applied to problems in mineral exploration and geological studies

Applicants should hold a PhD degree in one of the three lields of mathematics, physics or engineering, and should have used computing in post-graduate studies and be interested in solving complex real problems. Experience in Geophysics is an adventage, but is not

The person appointed should take up the poal before the and of June 1984. The appointment will be for one year in the first instance and, subject to the satisfactory performance of duties, will be extended for a further two years. FURTHER INFORMATION on the duties of the position may be obtained from Professor D. Boyd — telephone (06) 228 5843 and Dr P. Brooker — telephone (08) 228 5842 or telex

FURTHER INFORMATION about the general conditions of the appointment may be obtained from the Senior Assistant Registrar (Parsonnel) of the University.

SALARY per annum: A\$20,164 x 8 -- A\$23,100.

APPLICATIONS, IN DUPLICATE, quoting relarence number and giving luft personal particulars (including citizenship), details of academic qualifications and names and addresses of three referees should teach the Senior Assistant Register (Personnel) at the University of Adelaide, GPO Box 498, Adelaide, South Australie 5001, Telex UNIVAD AA 89141 not leter than April 1, 1984.

The University reserves the right not to make an appointment or to appoint by invitation.

Aly Force Geophysics Laboratory Geophysics Scholes Paogram (1981–1985). The Air Torce Templiyus's Laboratory (AFGL) and The Southeastern Critical Information (AFGL) and The Southeastern Critical Information (BLIFT) announce that applications are invited for treating appearature and applications are invited for treating appearature of the Lagrangian (Busics) Scholar Program, This program provides to arch opportunities of 19 to 12 months duration for scholar business and Scientises to perform treating to the Lagrangian and Scientises to perform AFD, in all Duston, Massachusetts Scholars will be selected permande from such fields as Lecophysics, Atmospheric Physics, Microtology, Ion Chemistry, Applied Science, Mathematical Modeling using Longoleus, and Lugmering

ompoless, and Engineering To Deschiptoles, confidates must have a Pleft or To be chighler, confidate semist have a Pk II for typic fleat representation in its becoming the few hineal belot. Some appointments in its becombined prior to August 1990 we can't applications are encouraged. All quantition applicants will receive consideration without region of to two colors, lengthin, see, or national ovigin. Application Deadline for September Appointments. August 1, 1984. For further information and application forms contact SCELL, 1101 Mayordusents Avening St. Uoral, Fl. 32769. Telephon. 3,955 892 to 10.

St. FP, Supposits Equal Dipportunity Alliamairee Atlan.

Geophysicist University of Minnesots. The De-partment of Geology & Geophyses meins applica-tions for a termine track position in solid car th geo-physics is growing tall 1984. We seek a Ph D and probably some proble total experience. The light of interest is open bur includes, but example, gravi-ty magnetics, global and regional terionics and the physical wave of the crist and manife.

Present research programs in geophysics include geomagnetism and paleonagnetism, inmeral physics at high pressures, and stustal scronology. We also

or man presented, and extend recombing. We also could true the interconnected in well geoglessed with the ne-house strong programs in anopreous and rectopic goes between a letter of application and attach a cuttoribus with a different of terrarile and traching interests, a list of publications and the names of three behaviors in letter had traching interests. Hancipe Department of Geology and Lie ophysics GO Edition's Drive, S.F. I inscisits of Mariesota,

Maticapelis, MN 71335
Maticapelis, MN 71335
The University of Monesota is an equal employment opportunity affinitions action employer and excounting employer and excounting employer transfer on the rigor applications from qualified scorner and minorities.

Agricultural Drainage. Assistant, associate or full professor joint tenure track faculty position in the Departments of Land. Air and Water Resources and Agricultural Lugineering, Qualifications are a doctorate in soil and water engineering, soil physics, or related held. At least one degree in engineering desired. Applicants must have strong tackground in water flow and solute reartivity in pursus media, mathematical and computer simulation modeling, and course work and/or experience in engineering design and evaluation of agricultural drainage usstrons.

design and evaluation of agricultural training tystems.

Teaching includes two undergraduate courses: a background course in water and solute training and description treatment of dramage systems and a course in design and evaluation of dramage systems. Additional teaching thittes include advising of undergraduate and graduate suntents. The appointee, after the everant program is established, will be expected to offer a graduate course in that research area. Research involver study of purcesses in the management of soil rabuite and dishow groundwater, including irrigated couplants.

Applicants should submit curriculum vita, transcripti, statement of research and leaching interest and background in each, copies of publications and manuscripts, abstract of dissertation and the manes and additives of at least three references to: Professor B. R. Nielsen, Chair, Search Committee, Hepartment of Land, Air and Water Resources, 121 Veiluneser Hall, University of California, Davit, California 95(d)t, by March 30, 1984, Position ir available mountiates.

Space Plasma Theoretician/Princeton University. A position total position is available beginning summer of 1984 in the Theoretical Division of the Plasma Physics Laboratory, Princeton Priversity, for one tean with the possibility of renewal for a second year. Physician with a Ph.D. degree or its equivalent in other reheant discipline are encouraged to apply. The position myndes thronetical and numeroral simulation studies on space positical and numeroral simulation studies on space positical and numeroral simulation with the members of the Laboratory engaged in Inston plasma physical interested candidates should send a resume and three letters of teronicalisation to Dr. H. Ukuda, Plasma Physics Indicatory, Princeton University, Princeton ton, NJ 08511.

Civile. Priorion, NJ 18511.

Primeron University is an equal apportunity/affir-

Sciences, University of California, Riversale, California 92521.

The Oniversity of California iv an equal opportu-

College of Oceanography, Oregon State University/Two Faculty Posidons. Sediment Groubrust or Sedimentalogist. 12-month, tenure-track position as an Assistant or Associate Professor in the College of Oceanography. Ph.D. in earth science, marine geology, or marine geochemistry and from putential or demonstrated ability to conduct grant-funded research required. The appointee will be expected to teach advanced courser in his or her specialty, ampervise graduate student research, and develop a atrong research program in marine rediments in at least one of the following areas: [1] mineralogy, [2] manion series/radiochemistry, [3) atable isomple attributy. antilier as applied to diagenesis, or (4) inorganic georlemistry.

Manne Geologist (Micropaleontology and Stable Iwologis). 12-month, tennte track position as an Asristant or Associate Profesor in the Judiege of Oceanography Ph.D. in earth teienre, marine geology, or oceanography and have a attemy potential or demonstrated ability to conduct grant-hinded research required. The appointee will be expected to teach advanced courses in bit or her specially, supervise graduate student rerearch, and combient a strong research program in marine geology and studie isotopes with emphasis on paleocranography and paleoclimanology. Send remine and names of three references by April 15 1984 in:

G. Rors Heath, Dean, Callege of Heamography Oregon State University, Corvullis, Oregon 97331 U.S.A.

Oregon State University is an Alformative Artiful

Oregon State University is an Alformative Artifold Equal Opportunity Employer and complies with Section 504 of the Rehabilitation Act of 1973.

Postdoctoral Position/University of Washington. Regard It Associate (postdoctoral) with lack-ground in physical occanography or attmospheric sciences and interests in dynamical associate of diregimes and interest in dynamical aspects of efficiency and interest approximate variability. Form of approximate variable for a second year subject to the approximation of the Council, Cheing date: March 15, 1981, Sent Curriculum vitae and a fixed bone 14 Februaries to Director, JISAC), (5) Impairment of Ameropheric Science, A&-10, Culversity of Washington, Seattle, WA 98195

An equal equationity/alliemative action employ-

POSITIONS WANTED

Mineralogist Geochemis). 31. Hipt., Ph.D., Fer-man, PS permanent-resident, visa, Lamar (impact, igneouv rocks) and terrestrial, (softmentation, meta-morphous rocks) and terrestrial geochemical/geo-chromology, broad analytical experience in US, English MS, INAA1, research experience in US, English French, linear, impressive publication record, seeks employment in rerearch, inclusive or sublishing hos-employment in rerearch, inclusive or sublishing hos-inest, in geographical restrictions. Please contact: Hr. Reimold, Inst. I. Minecalogy, Correnwar, 24, D-4-00 Minister, FRG.

STUDENT OPPORTUNITIES

Poaltion in Geophysics (Applied Solid Barth)/University of California, Riverside. Visiting lecturer opening beginning I September 1981. Although the initial appointment will be as a Lecturer, and is annually renewable, the appointment could lead to a ladder laculty position the following year. Appointee would leach both undergraduate and graduate level rourse in geophysics and tectonics. Ph.D. required, and evidence of excellent potential in basic research in any subfield of applied geophysics will be contribered. In addition to teaching, research and service are required of laculty members at the University of California. Applicants thould submit a current curricultum vita with names and addresses of three people who have agreed to provide reference. Applications should be complete by April 1, 1984; however, late applications may be accepted until successful cambriate is appointed. Send applications to: 1r. Shawa Biehler, Department of Earth Opportunity for Groduate Study In Igneous Petrology/Isotope Geochemistry—Southern Methodist University. The Department of Geological Sciences at Southern Methodist University in Dallas, Treas seeks unstanding individuals interested in a Phil program in igneous periology and/or isotope geochemistry. The uncerstal applicant should have a strong background in grodogy, chemistry, and mathematics and an interest in volcanic processes. Research will involve participations in a held-oriented petrological, geochemical, and isotopic study of Lae Compose volcanium in the Chilmar Andes. For lurther details and applications please contart either:

10 C. R. S. Harmon (214) 692-3075

Dr. M. A. Dungan (214) 092-2752 Department of Geological Sciences Southern Methodist University Dallas, Texas 75275.

Meetinas

1983 AGU Fall Meeting Report

In only Tellies the AGE 1983 Lift Meeting in San Lancisco accommodated more than 3460 areadors and more than 2100 papers. Each of the special all-l mon sessions arraned crossly of close to 1100 persons. Except for the 1982 Laff Meeting, which covered 8 days and included the American Society of Lumnology and Occanography (ASLO) Win-ter Meeting (1983s) was the largest AloC Fall Meeting care

The large mumber of presentations at the 1983 meeting was bandled efficiently by asstations more than the collaboration pages to poster sessions, who Is were no many participants the lightight of the meeting. Poder presentafrom the becoming extremely good, and some of the more spirited sessions make many oral present datas seem pale in conquision. The aght of some of the tould's leading geophysicross changing over a poster helper roult a surdem anested to one of the advantages of dis-

repe of presentation. If you missed this meeting, plan early to airead the 1984 Fall Meeting, Hecember 3-7, which will again include the ASLO Witner Meeting It will be held in San Francisco at the Civic Andronnia.

Changes to the 1983 AGU Fall Meeting program and adminial, late, and revised alsstrasts are printed below.

Papers Not Presented

3741-06, T. Scully. A12-13, C. Ganesh et al.: A12-14, W. 11. Braslev et al., A31-01, 11, 11 Stedman and C. A Camerell, A51-05, D. G. Torr and M. R. Total, A51 505, R. F. Shetter et al.: A52-11, 5 A McKrein.

G42-19, J. H. Karl, G51-13, R. E. Zlegler GPH-02, O. Ozdemr: GPH-11, J. L.

Ros, 14PH-10.1, 11/Al Bulicuik; 14P41-196, F. K. Tamony liments and D. L. Lin. HI2 01, P. M. Walls, 1122A-33, F. H. Weibezahn: H31C-04, A. Manneglest and L.

More than 3000 persons attended the 1983 AGU Fall Meeting in Sain

Francisco. Shown are some of them at the registration booth.

D. Evans, 1131C-12, A. H. Russell and E. G. Lappala: 1131D-07, 6, P. Kemp and J. T. Wells, H52A-02, C. L. Garnahan; H52B-04. C. Helvon and E. F. Woud. O11B-07, A. Huver, C111B-17, P. Flament

W. Orlhar; 1131C09, T. W. Schrauf and H.

et al.: 04(21)-15, J. M. Luck and K. K. Turekam, O21B-97, P. C. Fiedler; O22-15, N. G. S. Freeman; OBIB-17, W. B. Hwens and B. A. Warren: 1134B-18, D. B. Bomba; Cl34B-22. J. N. Monto and T. R. Osborn; G31H-24, M. S. McCarmey, Claffs-27, S. L. Benneft et al.; O31B-31, D. L. Evans; O31B-33, G. Reverdin and M. Cane; O31B-34, T. B. McCord et al.; O31B-35, W. K. Melville and R. J. Каррі: СВІ В-36, П. В. Аһшан; СВІ -04, Д. N. Smith and K. M. Ellic (142-14, J. F. T. Sam and W. B. White: 052B-07, C. C. Ehbes-

mever eral.: O52B-Dl, K. A. Potocki er al. P32-05, L. W. Esposin; P32-14, F. A. Kruse; P42-14, M. H. Bjorkman.

STLA-14, W. L. Ellsworth et al.: STLA-15. C. Vita-Finzi and G. G. P. King; S11B-28, D. S. Cavit et al.; \$12B-02, S. P. Morris et al.; \$21A-01, J. A. Collins et al.; \$31-08, S. Games and M. Fehler; \$32B-04, M. V. Song; S42A-03, G. Suarez and O. J. Perez; S42A-

104. J. R. Kayal. SA21A-02, S. Majambina et al.; SA21A-05, M. O. Chandler and J. P. Villain; SA31-02, M. A. Binudi and D. P. Sipler; SA32-10, D. A. Gell et al.; SA42-94, A. I. F. Stewart; SA51in, J. G. McConnell et al.; SA51-07, R. F. Daniell, Jr. and D. J. Snickland; \$A32-12, H.

. Fahr et al. SC11-07, D. Moses et al. SM11B-03, B. Hausler et al.; SM12A-05, 3,.. R. Lyune and D. S. Evans; SM12A-15, D. R. Parsgnault et al.; SM-HC-01, J. V. Olson; 5M42A-01, J. L. Horwitz et al.; SM42A-0B,

D. W. Dadewe et al.; \$M51E-37, R. W. Spina SS22-08, J. V. Hullweg and B. Roberts. T22A-01, A. T. Linde et al.; T22A-05, R. B. Gramell et al.; T41C-21, B. C. Haintson V. Lee; T41C-32, J. Thome and R. Bell: 131C-33, M. F. Callin and P. D. Rabinowitz: 132A-08, L. S. Chill: T42C-07, B.

V11B-06, D. A. Sverjensky; V21B-03, R. K. O'Nions and E. R. Oxburgh; V21B-08, D. T. Edudremani and P. O. Banks; V22B-07, R. Zhang; V31A-09, J. D. Friedman; V31B-02, G. Ivarsson; V31B-97, P. J. Kunydlowski; V31B-13, J. Helgason; V32A-11, B. R. Julian and S. A. Sipkin; V41-02, R. B. Wabt, Jr. and N. S. Macleod; V41-05, T. C. Pierson and K. M. Srm; V41-mi, R. L. Dinehart; V42A-38, T. H. Pearce: V51B-15, M. S. Weathers et al.: V52B-09, J. D. Morris.

Late and Revised Abstracts Aunospheric Sciences

Er-wire discemberio Potential Measurements at 1.5 J. WOOSLEY R. HOLTMORIN | both at Gasphysics Grogram, Univer-atty of Washington, Seattle, WA 98195)

Coelinusa Aimospheric Potential assurements with the My-wre telbered battone system have been cade for duratice of "#6 hours at 1.5 hs sittude and "#6 hours at 1.1 km. 1-hour everages of the 1.5 hs dafa compare favorably to the Carnegle curve. The 1.1 km data above a stailer durant patter with sceenbal greafer vertailon from the assar, yurthermore, a ctear sleatric field variation with sititude is assar shows a few hundred meleracy urthermore, a ctear sleatric field variation with sititude is assar shows a few hundred meleracy charge-disoberge lias cocetant assaurements indicate that the Hy-wire source impodence is on the order at a few tiass [#10] at both sitlindes in agreeced with asriier lower altitude measurements. A Carnegie-like patiers is shown by Hy-wire currect measurements in the grounded mode, which have typical taluas of *10 v A during has pelectial minimum and *20 v A during the maximum. Ground-hased \$1 field assaurements with a field alli show so ashanced \$1141 in the violinity of the apparatus in serement with a simple electrosistic modet of the ulre.

Geodesy

The 1992-51 El Sing and the Earth Retailon

Maria Maria de la Carta de la

L. M. Estarka h. C. Perajulat d. O. Mirtoy J. A. Taspo (mil at Jet Projulaton Laboratory, Cajt-firals invillate of Technology, Pasadons, CA 91109 G. D. Poesa, D. A. Salstoin, Armosjhurio and Paviros-nonial Coperuh, Inc., Castridgo, Hannachumita The 1982-83 Et Mino was observed arrived by wide approved changes in the sistemphorie and escenticification, The statement oscillation indee, a server of the internity of the si time, reached record loss in January, 1983. The paried between incomber, 1987, and type, 1983, is also associated

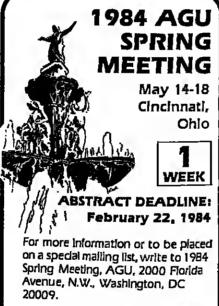
AGU President James A. Van Allon (left) presen. (46 - 8) 1982 Waher H. Bullet Med J. Wohn W. Ha off 18

Geomagnetism and Paleomagnetism

GP 32-21

The meanagetic data coltacted during the International Managedphoric Stedy (1881 international Managedphoric Stedy (1881 interval hatween 1004-1990 as the Casteling Stations to estad along the Churchill array are used to accept the Linguiser frontions to investigate the conductivity structure in the togion. The trapper should prove suggest that an early well treading to increasing the conductor press proper side of the conductor principle of the conductor with the well of the conductor with the world by the conductor.

THE RESERVE OF THE RE



with highly anomalous ohanges in the Langth of Day 1000 and the Almophoric Angular Parentium (AM). The AM reached a record high in late damary, 1983, which is matched by an unusual peak in too 100 si the name line. These changes were due to a scalinging of leopical casturies and a strongthraing of too mid lasitude venterles, aspectatly in the amptions hecisphers. At least 3:102 kg of small of statement angular momentum was shoor been and then test by the atmosphere during the juried from aid damary to mid February, 1983. Changes in the atmosphere manner of February, 1983. Changes in the atmosphere manner of the february, 1983. An amount to the same of strictuling of out soon to have contributed significantly to the Jouanny, 1983, AM amount, in the contribution of 100 date from the previous strong Et Mino in 1972 shows no unusual 100 changes. The relationship between the donuary, 1983, ovents and the amount cycle of Angular Momentum will be discussed.

Call for Papers Published

In Eos January 10, 1984

CRUSTAL HAGHSTIC ARMALIES IN CANADA

d. AMERICANNED, M.C.S. URQUEARY, O.M. STRANGMAY, Department of Geology, University of Toronto)

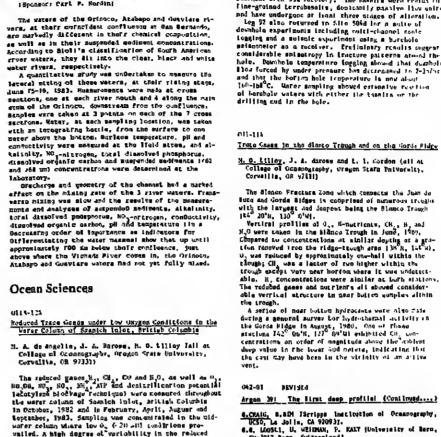
The crustet scalar magnetic anomaly map of Caneda sed the northern United states deduced from McSAY data is downward conclined to 5 be attitude. The anomalies have no obvious correlation with testonic provinces, but they do appear to correspond with certain types of sedtmentary hasins. Busins associated with old but spots and intercontinguist rifls have positive anomalies, whereas those in its centro of craters have regardly anomatics. Modern hat spots and mountain ranges also have cogative ampastic anomatics.

Grant Burks, N.D. Surtz sed F.A. Capiletd
(Division of Salumbiosy and Godesportsm)

Earlh Shysics Grasch, Ottawa, Canada, FlA 073)

(Sponsor: M.O.S. Sachbinder)

he induction Assembly on the West Coast of



Hydrology H224-13 REVISION

Ocean Sciences

Downstress Laboral Mising of Mators from the Oringgo, Atabago and Guaviete Pivers, in Bouthern Veneyuels. TRANC S. MEISEANN | Instituto de Pecursos Naturales, Universidad dimon Coliver, Caraces, C.T., Venegualsi |Spansor: Carl P. Nordèn|

U123-13A The California Coastal Current Progress

PLUTCRAK, ROEL B. and ROMFRT J TAIT (Raytheon (5126 Relation St. Venture, CA. 90099)

Under the apunouship of Bureau of Interi Kinerii Kanogement Service, en extensiva pri of asseuremente in the acasalal ustara of cer Caillarnia i Polet Conception to Son Frantarco i a tepinning in Mayenter 1983.

Esseurement components are: ii Time van Zosaurements of curroni apsed end direct prosaure, temporalure and conductivity at moc citco selected to best capture the flow pail indicated by the reduits of historical stud Thece have characterized the large ocala feel of the region as a number of flow reg approximately parallaling the trend of the ed. 2) Kesr-aycoptic hydrographic lines run rou normal to the acast at intervals along the coff of km and astending off-there to about 70 Ze)Cantinuous current profiles elong hydrographic tracks using a ship mounted dop acoustle mater. 3) Reer-eynoptic merial map of the surface (100 feet ASL) und and tempora flated and the surface radiant water tempera of the surrose (100 leet ASL) und she tempers flatds end the surrose redient water tempers over a limited geographic sram in the visinit Point Conception during the hydrographic sameureante in that area. 4 Aerisly ma Lagrangian motion along the hydrographic 1 during the time of hydrographic work and she the leostions of pertinent email scale aur motions shown to exist by extailite imagery.

Historical and anoilliary data from other acount the region will be collected into the data for guidance in the sumpling deater and comparison with the second results. Particular which from the social sites, one and offshore will be smallyed for their inlius shifts in the current structure.

in advisory committee and workshops will

1. 3. WARTIE-SitVER 1C.N.R.S.-University de Perpiyaan, 66:000 France, and Carnegle Institution of Machingran, M.E.A.)

The chemistry of live hor aprings alteated on islands from the Cycledes were mindled. They are located un lend or an ace, on the bottom of bays or Fractures on Santurial-Nes Kannul ifference and Marsilor, fillow iffucively non districted and situates if the recognition of the property of the apring shows the strong participation of seasons in the aprings which forther out low maying lead to seasons in the apring with forther or low maying lead to a seasons of the laterface between hydrothermal fittles and sea water, arrang protephatic overnor. The new anterial formed is precisely and the interpheta to arrange land is precisely and the serpheta to arrange land in the first partial given a fittent of an assurer, rocks and soliments surrounding the courts of the hor apring depend mostly on the pland chartery of the hadrothermal Hold. For example, in fills in the findertheal fills. For example, in fills in the findertheal fills. For example, the plan are low fall all districted for and Mn of the live water also were rish to the fill and in of the live water also were rish to the horse accountrations of districted for and Mn of the live water also were rish to the horse accountrations of the soliton of the state and land, where the pi of contents surrounding the water also were the pi of contents accountrate in a fill and a fill the horse of the state and land to the special where a surrounding motorial. We lead to the particles and the or the are ultimeted, the form of the unaltered rocks, five and K are always depleted, whereas metals such an Cu or he are ultimeted, the fills are frequently associated with the additional fills.

11112

HTEROGRAP RESULTS OF ESDP LEG 42

H. LEINEH, (Graduate School el Oremography, University of Rhodo telend, Earragansett, Dt 02882-1971.
D.E. REA (Department of Almosphoric and Occasio.

Ltg 92 comptated smiththeniplinary hydrogenlogic studies of seven eiros An the Pacific to ements the controls on past and present hydrotherbal processes. Six two ettes. Sixes 397-601, were detilled in four accommendation of the sevent on the west timb of

lour deliting access were approximately 28.5 th., II Ha. 18.1 Hb., and 4.8 da. The sadicents at those with various of the sadicents at those with various of the sadicents at those with various proportions of the sadicents at the sadicents of the sadicents of the sadicents and the sadicents and the sadicents and the sadicents and the sadicents of the sadicents. The sadicents of the sadicents. The sadicents of th

Trate Cases in the diento Traugh and on the Gorde Fidge

N. O. Lilloy, J. A. darose and L. I. Cordon (ell at College of Oceanography, Oregon State Entworsity, Corvellie, OS v7(11)

during verrical activities in mar butter varies among a sentent for the free of mar butter hydroclasts were also find the Gorda Hidge in August, 1980. One of These stations 142° 00° 11, 13° 00° 11 substitute GH, concentrations on order of magnitude above the "ordered duep value in the least and natural, indicating that the cast may have been in the vicinity of an artise vert.

Argon 391 The lirst deep profile! (Continued....) e.CRAIG, 8.804 IScripps Institution of Oceanography, UCSO, La Jolis, CA 920931.
6.6. LOSCI, U. Willman, P. RAIT (University of Bern, Cot-1012 Bern, Switzerland).

The lirs: dupth prollie for 39Ar is constrany produced "non-transient" traces, mean-lile = 385 years = 51 of radiocarbon mean-lile was reported for surface, 250 m, and 500 m depths of the N. Pacific Groness 1 "St of radiocarbon mean-tital was reported for muriace, 250 m, and 500 m depths of the M. Pacific General Station, row years ago [Craig, Mm. Pacific General General

Modeling Stdrm-Driven Currents in the Senia Berbara Opennal R. 8. Gordon | 1 - on Praduction Retearth Co., Housida, ix 1700)

The response of the Santa Barbara Channel to Flore winds was investigated using a two-disensional [s-al, two-layer numerical codel. The model has a surface claded layer that entrains according to a velocity dependent parameterization, and a tower layer in which the denaily varies linearly with depth.

The passage a) a alore that acturred in Faduary, 1999, was risulated in detail in order to illustrate the highly non-linesy response resulting from large displacements o) the thermocline and from the entralment orders. For bits flows, estimates of the inequalization before present gradient erre verilable from culticolon conducted at the directity of California, Sante Sarbere, using a large-dimensional model covering a large soction of the California better the conduction of the California shall surrounding the Channel.

In this simulation, it was necessary to increase the depth of the near-share grid calls in order to prayest the thermocline from intersecting the bottom. The effect of this artificial deepening was set leasted quest effect by sing Casmady's linear coastel jet theory for a channel with arbitrary depth certains.

Because the entretment rate is such a highly non-linear function of the atand-layer depth and the valocity difference between layers, the semitivity of the com-puted solution to uncertainter in the initial and forcing condition; and to grid resolution and horizontal eddy viscosity was investigated.

Seismology

Sejanic Recordings Containing Prequencies in the Audio

F. CRAYSHICE |U.1. Geological Survey, 145 Mitalaliate Food, Mahio Park, CA 94021)

F. CAMSMICE BULL, Geological Survey, Any symmetric Road, Panho Park, CA. 94021)

Tregometies as high as 100 da are present in the selamograms of recent alteracts of the January P, 1002 Hiramichi, New Bruchwick seribasts. Both bourcet and receivers of these selamograms incorded in July 1981 are located within the boundary of a grantific pluton their under lite. The electrocy cone. This high industry the moment was observed at ranger of loss than 101 met; sind different stations all of phich ware negliged with three-component 2 %2 valually inguitable sited directly on asserved noteroop and recorded by GoS dipital selamograph sembling each component at 100 day on the vertical end not incomponent at 100 day on the vertical end not incomponent in records made with leanticel instrumentation at a singuistic process and with leanties in strumentation at a selamograph tendentical instrumentation at a selamograph tendentic in the process made with leanticel instrumentation at a selamograph tendentic in the second with the received at 1200 con per channel dipital incords associated at 1200 con per channel frequency limit at shout 100 Mz.

The presence of these high frequencies indicater frequency of the difference betanen the resonant frequency of the vertical components and that of the horizontal components sudgest that the service of the first young at the selection of moters a sudgest that service must at the service of moters and conduct and service of the service of moters and conduct and service of moters and conduct and that of the workers of moters and conduct and service of moters and conduct and service of the service of moters and conduct and service of the service of moters and conduct and service of moters and conduct and service of the service of the difference betanen the resonant frequencies of the difference betanen the resonant frequencies of the difference betanen the resonant segratic fiels allows under of these to persentally enter the asymptophers. Because of the symmetry of the asymptopheric asymptic lusts, the flux of entering particles is trio along the monerational particles place the entering particles is trio along the monerational the squaror slong the flushs of the segmentiques and six occurs in the dayside cosp regions. This entry bodet suggests that the AMPTE raisase near the autocler point will place the tracer form near the surgiciar point will place the tracer form near the region of missions entry. At the icas move through the sales and are dispersed down the days limit of the saystoophars, the entry rair will increase. The mation of the sans after entry will depend on both magnetic and

electric field atour med. It is reported that the electric field itself are. It to sepected that the contribution of the translation of the expectation of the translation of the expectation of the translation of the expectation of the

When you want fast advertising results, you want Eos.

Eos delivers. Every Tuesday of every week Eos is read by

Advertising in Eos results in accelerated sales and recruiting.

For low advertising rates and copy deadlines, please call:

over 16,000 geophysicists worldwide.

Robin E. Little 800-424-2488.

Evidence for Jusernosi Mantle Htteragenelty (ros LASA

A. Powell (Department of Goology, USC-Chapel Hill, thaugh Hill. 8.C. 27514)

array determined azimuth of approach, ... valuet for interestrict ovents occurring or distances exceeding 90° agree favorably with values predicted by the new codel for lower entitle heterogeneity determined by Dissembli (1983). Agreedent was noted for low large arrays located in the western U.S., LASA and Hanford-Predicted 2 anosallos calculated using the Oriewashi model agree in sign and relative amplitude with 3 anosallos calculated for LASA for nine out of ten globally distributed tay justes. LASA t unusualles are always larger in absolute magnitude but this it to 00 equeted as the Otlemenshi model perduces a low pass littered lees of the velocity perfurbations. Insert cast of the selection of the product of the product of the velocity perfurbations.

structure to needed to explain the IASA and Harford anemalies associated with this source region. Of

SPR: Acronomy

SPR: Cosmic Rays

B.B. FRINGS(S [ESL/JH), Laurel, HO

cancelles associated with this according to the operation of the second of the second of the second of the second according to the second of t

A Second 14th epicetic interior on and 1th and Space Sciences Distinct, Los Maria Maria Strang, Los Harus, Swintsian Liberatory, Los Harus, Swintsian Haria Sel International Medical Property of Maria Paris China California (St. A. Nelron [52] International Medical Fara China California (St. A. Nelron [52] International Medical Fara China Ch

Chaptrations of the t-W Asymmetry of Solar Place 836 Eyents by the DMF-7 and H a/c.

e.c. recentrous, <u>e.t.</u> <u>BAFP19</u>, d.c. ANEGROST(POUL)3 [Demokritos Unaviof Tarace, Manual Greece]

Shirtingdes (thium), Learni, 201

Observations of energotic-size interasts, enhancements is 200 very associates with shart flare quoerates shock vives (solar flare EUS events), obtained turing meetly a decade by the API-JMU instruments on board need to ensure the API-JMU instruments on board need to ensure the total on the flare scale such an order to ensure the total on the best and seem and the apirous abording the apirous angular relation to the upstream interplantary magnetic fluid in the finishation of these EUS exerts. It is shown that a clear flare that about healthy what the state to the helicituding the EUP relative interasts what comments with respect to the helicituding these of the shock wave source-flare acres. The large located to the partial associated and the source of the spring the street on the architect sole lines at the sole lines at the sole of the spring the second on the average only week SSP events are essentiated but soler lines at the to the Mest of the spring the sole of the spring the spring the sole of the spring the spring the sole of the spring the sprin

Meridian. The observed measurefur and rea implication on the dominant processes for the generalist of the solar liera ESS events are discussed in the bears of the

SPR: Magnetospheric Physics

Inclications of Steady State Particle Antry for the ACCT Program

y, F. 04308 [AcDonnel's Douglas Astronauties Coupsny, Mustington Beach, CA 92647 S. A. Feltzir Nichomeal Douglas Astronautics Cumpuny, Mustington Beach, CA 92647]

Studies using remlistic suggestic limit models, has shown that KeV purticles can under the sagnalosphere can when it is suggestically closed. This lors of charged particle entry proceeds at all times and laftimences hany steady state sughsto-sphere processes. This entry sactionism is present because when suggestomath particles impact the suggestomate, they encounter a gradient is the suggester ited parallel to the suggestic lied parallel to the suggestic field parallel to the suggestic field parallel to the suggestic field parallel to such a structured suggestic fiels silver some of these to persuantly sever the assessments. Become of the sympatry

. It was a time 1 and 1 the state of th G. 158 and t. S. 148 theories of distribute. Edwards, of Marks, Estategie, Marks (1988)

to table report, a modern consequence of the In this reputy we had been received when deep things have the Minister two which is a state of the reputy of the part of the state of the reputy of the repu

 $\frac{1}{1000} \frac{1}{100} \frac{1}{1000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{$ many the foundation should be for the control of the telly be soon the cybe J. R. Malcoff Directors is because brown a first to a fine Sciences. Obstacles, the Stimes Mattered and States and States

en de la companya de

The thorp, or differ to be all a clerate the applied as the construction of the state of the sta I than alteration to presented only the collections are

At 2142:18.5 WH on 2 Par, 1973, a majorite earth-cally occurred approximately 11 am monthwish of Callings, Callfornia. The bis-logs wave general to this carrhquate coupled course source general to the stroughers to general a pressure pulse that created a lateurance was detected by in immagazine mailtoining metaph at five locations that were toparated from the earthquate application to between 160 and 201 ms. These observations are the first immagazine disturgances to be reported this class to an earthquare enloyater.

 $\frac{(0.10, 0.10, 0.00)}{(0.00, 0.00)} \frac{(0.00, 0.00, 0.00)}{(0.00, 0.00)} \frac{(0.00, 0.00, 0.00)}{(0.00, 0.00)} \frac{(0.00, 0.00, 0.00)}{(0.00, 0.00)}$

The feet of the transfer in a partially open as estimated as assembled which became also the limits of a feet of the report of fraction depth of the Theory of the Theory

Comertical Similation of the Yearing-Mode Contability is an Animary-pic bouted input

J. 1. Ambryation (Serbatory Scholure, Inc., F.O., S.: 452 Sgringfield, Wirginse, 22170] L. C. Lee and J. F. Fu Jürnyiyiled Sostitute, Palvarmafir at Alesba, Salabada, Elesba 981011

A gregosafic stade, utilizing a connectable securities efsolution, in performed for available the tearing-mode of bility graperties of a first-received player such as a subject to a such as a subject to a sub including the length and width of the electrical legion; however, the convection from Augustic to Timetic source; To Sm early case onhan:ed by a T. of, antertropy

4. C. Lavel and A. Potlat, Fuon Sr-16,5 ((199).

. I, Then and B. Salmadonan, Tearing introllities of an injectopic Neural Theel', substitued to Phys. Visida (194)).

Tectonophysics

TARE OF THE STORY Pitramonte Measurements of V_p and q_p^{-1} on an Allalian Gasatt Moit: Indivert Defection of Classery Values

Meetings (cont. on p. 58)

56

57

Meetings (mut. pma p. 17)

There is a special or any also, we filled.

There is a special or any and its (25) and allowed the form the filles of the following the filles of the second of the filles are compared with a reliant tary an order with parallel bounds to the registed records by full of his (1982).

Auf die neibrastian Assatistel wich Assistate Thinnings in herschant Surfaces

. / lo., ... II — (Dept. of Style Engineering. B. (-T. - Campatin, Mast., 92119) M. L. P., Campadie, Maga., 121191 5. OStill (Sept. of Weeth and Glenotary Science 4.1.f., Cambrillia, Mast., 323193

Severas designological, quotatt; and heat flow 4 terribustion observations unjust that is fair to 4 terribustions flust day him a bear times approved out late neval hardrittal laterinant aufferes, se has been prooperantly attp on which three-money decombons lares are indicate, consumplying and time-bronfeer. So is important to interstant the all tones of they approprie alteration which way are to produced to being modified directions and topic to attentions, is their such action may thing a still strong that any the same and all sides of the same and all same and the indrak () bir biran ing pingkang lang. Manama pangatang ang pi Manan katantan kilan mang kamanandang panahagi alah menjang thinker roll in the tillhorn fattfirms to tribe tion of the to the last terry years.

And the Colonian of the one payment despite the colonian of th the Section of Marian all the Contraction of the Section 1997. The Contraction of the Section 1997 and the Section 1997 are the Section 1997 are the Section 1997 and the Section 1997 are the Section The fitting of the control of the project of the control of the co Property of the second of the All the second of the second o correlation of the most annual consection is reasonable to that the scale of a product of the scale of a product of the scale of the sc

CATHERMAY (MARKITHALES) AS MALE CHENCILES STRUCTUP-LE NEW CHEST CHEN HERMAN THE CHARLEST CHENEX ACT HE CHEN VALLY SECTION.

Oppleting: Abieti (it.s. Geological Survey, Benlo Park, CA 9402) Tyorson: 0,0.18AFE,JR4 He local approach of voluments, monumerable, tollate segmentative procedus in the William Springs tectron of the diest Valley Repeated appears to be a direct vollenthological response for a location accretion event in the Coast larges. Hold and porrologic stalles established the relicuing scenariar Hold, Catacoas application to locat plate franciscan rocks (Indian Valley tectars) foreath the prote-Coast Range thrust, 21 deformation of footh the upon and locat plate rocks into the coast large thrust planging antiform of the William Springs attraction, and, it contraponeous potential or separation than the contraponeous potentials.

The serustine natrix and the bulk of the inclusions were derived into the subject ophicities at the base of the deet Valley September. Parer clasts of amphicities, How schiefe and course activality-adjects schief are

the so it wally seperate, where the so it amplication to the solid are life solid to be high-grade schild knockers in Franciscon melange fells to the west, such intibologies, hitherto excellent outricted to the Franciscon, are equally
eacher to the tectoring upper plate rocks and provide
the excitent them consists of the surface of a pretransferred in separate the transe that must to at
structurally greater depth learned that frank various,
Existence for excelete round-trip recycling of blocks,
transferred in separation in an excitence prime in
self-demented. The relative role of politic various
exponentials relays transfert of tectuals blocks in
structural transferred and tree-few of wellthirty return than dispirite officiency of other ratherrole, it is a greatised that conjunitate protruite
transferred and the preventions in reasons or sec
transferred from the transferred in high solinost
constitute the preventing transferred in high solinost
constitute (transferred last superra).

Volcanology, Petrology, and Geochemistry

street, constitution to these Liberary Studies of the Pluid Dynamics of Violent Volcante Emphase

SCAN STATEM CLASSES [U.S.G.S., Flag.Laff, AZ 86001] California Statistical California, Passiona, Ca 91125)

Games that are profilent bounds to greeous volcanic limbs have been emptiod from towardours up to 1 bits procuse to that it where. The greeoused are belien lands st. 4, a = 1.67, office of 1 limbs at 121, a = 1.150, frond=12 limbs at 121, a = 1.150, and Frond=12 limbs are 121, a = 1.150, and Frond=12 limbs are 121, a = 1.150, and Frond=12 limbs are that are of the recently has been conflicted with pressure transferors and the flow I field photographed with archaeous agreed to the distinction of the recently are the flow field properties and the changing reserved condition are to arready. Reserved as easies in the up to about 400 m s. equilibrium from a light-pressure recentled are friggered be brottley of a dispersion from recently the extractor of recently for a light-pressure recently are religious from a light-pressure recently are religious of the orities. For recently pressures of 1 bars, the less are initially superconfer they should pressure and 1 bars, the less are initially superconfer the substantially observed of the leafures of the office of the first manner of the leafures of the orities of the leafures the superconfer to the leafures the recently desired to the forest bond, and any arms of per unit for carried bond with any large and the carried when the relation of a superconfer of the leafures to the light that the substantial of the fill that its breach study that it is a light-pressure repaire when the carried study on the well of the fill of the light that it will be the light the fill that its study carried at the light of the light area than are pool or elopares to green a volegate fluide have

one, we first that the state of the first test that the state of the flow here; the strength of the flow here; the first two deputes on the strength should be seen deputed on the state special flow continues. The strength of the continues the strength of the continues the strength of t

One distorer at base - 45"

COLUMN CONTRACTOR OF THE PROPERTY OF THE PROPE

Geologic map of the Hio Grande

Rift and Southeastern Colorado

Plateau, New Mexico, and Arizon

(1983) by W. S. Baldudge, Y. Barlov and A. Kron

This map indicates the geologic and structural retationships among the varied lectonic elements of the Rio, Grande Rift and adjacent Golorado Plateau

Side oer is puried on a mosaic of Landsel in-

. . . 36" × 46"

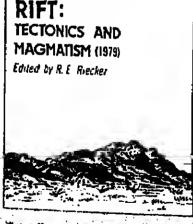
ad Basin and Range Provinces

Referenced and Of cm. 117 cm. should be a suited

• Futi colds

172

The first of the control of the cont REUSPECIAL Book and Map COMBINATION DISCOUNT \$35 RIO GRANDE



'It is in the successful exposition of alluhes of all aspects of mis that Rio Grando Rift is outstending ... The papers in the look one Hilbfr.to become standards against which future till stodies Science

This conference of constitute complete introduct an array from the intelegational Springlished to the Re-Grande Sub-Heat reading for plants out to granted little.



aren di ci

Best tree relations rates to problem on a USUS

30% DISCOUNT TO AGU MEMBERS Side two relationer risp is priviled on a USOS.

Depositional ramps of the Ata pyroplastic flow deposit X.SUZUKI and T.U! (Department of Earth Sciences, Faculty of Science, Nobe University, Mads, Kobe

The Ala pyroclastic flow deposit is one of lerge-scale pyroclastic flow deposits erupted 30,000 - 60,000 years son. The eruption was started with small-scale pitnism at rell, local minor pyroclastic flow and secended by the cimes eruption of the Als pyrofissic flow. The deposit is densely walded, even to case of a thin deposit. The deposit shows e daymenics distribution eithle a waitor chastic flow. The deposit shows e daymenics distribution eithle a waitor chastic stops of a besin. Such a structure was named depositions! ramps (i) and recognized in selde valley or basic whose width te more than I am. Height difference between the highest end the lowest points of a single depositional ramps is larger in elder valley. Seeping directions show the radict directione away from the source. Scale of dopositional ramps decreases with learness of distance from the source. This structure is regerded to be formed by the excellent accumulation of pyroclastic materials in a windward-side rether than a lee-mide within a valley or basic. Dip angle of the original seriese is assumed ellihe 4°, which is similar to the repose engle of lerge-scale pyroclastic flow deposit previously described. The asses structures were also recognized in other two densety waited pyroclastic pile deposits best on pablished geologic map and topographic map. But this structure is distinctly to find le a noe-welded pyroclastic ilow deposit. This suggests their high emplecement temperature is helpful to furm depositional ramps.

[1] Smeukl, K. and UI, T. (1982] Geology, 1D, 429-432.

Checked and Lectopic Composition of Case Stable Not Spring: Magnetic CO, Hear Mamoth Lakes, CA b. C. TAYLOR |Department of Coology, University of California, Davis, CA 950(6) T. M. GENLACH | Isandia | National Laboratories, Albuquerque, MI dil851

Albuquerque, 89 dil851

Combined chemical and isotopit analysis of toparolic gases collected at the Gese Bishlo Mat Springs Booling; 39-97°C) mare Massach Lekes, CA, indicare that magnetic CO₂ in presently reaching the surface here. Fifteen vapor-phase scapies were relicated in 11/82, 1/83, and 4/83 using a thermally insulated cube inserted a mater into the locarole, and overcend sampling vasuals containing albalius solutions. This isothetopus procluded condensaction and direct atmospheric contamination during sampling, the latter indicard by low levels of a, 10,000 sole t) and O₂ + A; (**O,7** soler pps). Complete chemical manysis of the samples yinided an average composition (in sole Pi o) 49,A; (**O,5** OO; and 0,01 to 0,04 total 5 instily and hight SCI, Nt, O and hydrocurbonn other than CN, are being detection limits. Sy and CN; did not excend molar pps levets.

Carbon leptops analysis of separated CO, indicated A **C values of -5.59 and -5.60 900. These A-values are within the range of compositions of O2, from fluid inclusions in the gases and the practic of identical the Case of bolo O2, compther with the absence of hydrocurbons in the gases and the paucity of idensions in the gases and the paucity of identical the contracts.

non-majoralic sources on the principal origin to the On.
These data suggest: fit Co. is exsolving from sayes henceth Case Biship, and 12) monitoring the relative Co./k.o ratio of the improise gases again prove useful to evaluate subsurface sovements of

Assessing Nuclear Explosions

The all-Union session on the Geophysical and Georhemical Consequences of Nuclear Explosions at the 1983 AGU Full Meeting attracted a large audience, and many were imable to firm a sear or standing room. The speakers and questioners emphasized the complexity of the processes and the need to extend the computer models. In particular, the global-circulation models presented by scientists from the National Center for Atmo spheric Research showed that smoke/dust clouds should cause major changes in the weather systems with great contrast between the temperature perturbations over oceanic, coasial, and continental regions. Important developments in the models and conclusions can be expected over the next few years as AGU members from many disciplines contribute their skills. On behalf of the Public Affairs Committee, I want to thank all the speakers at San Francisco for their excellent presentation on a difficult sobject.

This meeting report was prepared by Joseph V. Smith, who is with the Department of the Geophysical Sciences, University of Chicago, Chicago, IL

Latin American Geomagnetism Workshop

Modelers of the earth's magnetic field look in the network of magnetic observatories to provide information on secular change. Others, studying the shorter period variations, want the observatories to provide digital, machine-resulable stata. Whatever the application, whether it he the data base for the International Geomagnetic Reference Field, time extrapulation for satellite surveys, or magnetospherie rurrent sunlies, all users want more from the observatories than is presently available, especially from that part of the world composed largely of developing countries. Money might solve some of the problem, but it is generally onavailable. However, there are other factors, some of which

are more amenable to solution. In an attempt to improve the thata base. there has been proposed a series of regional workshops, bringing together the operations people and the users to discuss problems and olutions. The first of these was the Worksliop on Lailn American Geomagnetic Observatory and Survey Practice held at the Observatory valório Nacional in Rio de Janeiro, October 16-22, 1983. There were 45 participants from 15 countries of Latin America, North

was to improve the quality of the Latin American genuagueta programs by informing the participants of the state of the art in the various areas of gromagnetic work; dis-cussing common problems and their soluthurs; promoting information exchange by personal contact among the participants pro-riding information which might assist in strengthening the bases of mational programs; and encouraging participation in in-

ternational programs. The following topics were covered: obser-natury operations, field states, magnetic instriments, field muleling, magnetic carography, uses id magnetic data, and national and international programs. There were formal papers and round taldes; japers were delisered hilingually, in English and Spanish or Portuguese, Several important needs became apparent during the proceedings. These were put in the form of resolutions, including the enconvagement of geomagnetic research on regional phenomena; periodic checks of observatory standards against the International Magnetic Standard; the desirability of digital recording; improvement in appartunities for training and exchange of personnel and information; and closer collaboration with IAGA and the World Data centers.

Positive steps were taken by participants to ward establishing new observatories in some of the data gap areas. All agreed it would be appropriate to have another workship in 5-10 vears.

This workshop was sponsored jointly by the Sociedaile Brasileira de Geoffsica, the Observatório Nacional, the Pan American Institute of Geography and History, the Inter American Geodetic Survey, the Instituto Geoffsico del Perti, Worhl Data Center "A" in Boulder. Colo., and the International Association of Geomagnetism and Aeromony, Co-organizers were J. S. Lourenco of the Brazilian society. L. M. Barreto of the Observativity Nacional M. Casarenle of the Pernyian institute, and K. L. Srendsen, representing World Data Center "A".

The Observatorio Nacional is planning to publish transactions of the workshop, Papers will be in the language of original presentation and abstracts will be available in at least English and Spanish, Distribution will be to the attendees, or those Latin Americans who were invited but could not attend, and to magnetic observatory operators throughout the world. Imprivies may be directed to L. M. Barreto, Director, Observatorio Nacional, Rua General Bruce No. 58ti, São Cristévão, 2002 | Rio de Janeiro, Brazil.

This weeting ceptat was contributed by K.L. Srendsen, who is with World Data Center A. Boulder, CO 80303.

Actions at Hamburg

International Association of Seismology and Physics of the Earth's Interiors

President: Ziro Suzuki (Japan); First Vice-President: St. Müller (Switzerland); Second Vice-Presidenti A. V. Nikodaev (USSR); Secretary-General/Treasurer: R. D. Adams (UK)

Executive Committee

B. A. Boh (USA); E. R. Engdahl (USA); C Froitlevaux (France); E. G. Kansel (Chile); Xu Shao-xie (China)

Commission Chairmen

Commission on Gontrolled Source Seismology 11. Shimamura (Japan)

Commission on Earthquake Hazards Co-mittee on Earthquake Hazard Assessment: M. J. Bercy (Canada); Committee on Earthquake Prediction: F. F. Evison (New Zealaml) international Heat Flow Commission A.F. Beck (Canada) Commission on Microseisms [. Darbyshire

Commission on Physical Properties of Malerials of the Earth's Interior T. J. Ahrens (USA)

Commission on Practice E. R. Engdahl (USA); N. V. Kondorskaya (USSR) Commission on Quantilative Geodynamics H. J. Neugebauer

Commission on Selsmological Theory J. H. Woodhouse (USA) Commission on Strong Motion Seismology B. A. Bolt (USA)

Commission on Wave Propagation in Real Media S. Grampie (UK) European Selsmological Gommission "H.

UNESCO/IASPEI Working Group on a Gode of Practice for Earthquake Prediction

In recent years, a number of earthquake predic-tions have been made, both by individual scientific and by institutions, some of which have proved successful and have been followed by action which has resulted in the saving of human life and the reduction of material losses. Others have been unsuccessful but their publication has led to serious disrup-America, ami Europe. The stated objective ful but their publication has led

then of economic and social activity in the areas al-

The successful prediction of earthquakes is an important scientific objective, and research in this field should be actively encouraged, but it is clear that scientists who are engaged in such research, and who find themselves in a position to make predictions, must be at an unusual degree of social respon

Ill-considered release of a prediction to the public thomain may have grave social consequences; on the silver hand, a successful prediction may be insurumental in saving many lives but only if it leads or appropriate and well-organized response by the community concerned

Following an agreement reached between UNFS-CO and IASPEL, a Working Group im a Code of Practice for Earthquake Prediction met in Hamburg August 12-13, 1983, A list of the participants appears at the end of this report.

Given the wide variety of social structures within which research on earthquake prediction is conduc ed in various comutries, the task of defining a Code of Practice having universal validity is one which will require wider study. In dualting this code, how ever, the meeting regarded its task not as one of delining a code of ethics, but rather of recommend guidelines for the more effective forumbation, evaluacion and communication of carthquake predictions for the benefit of society.

Code of Practice for Earthquake Prediction

The objectives of this code of practice are as fol-

1. To ensure that scientilic carriquake predictions are put forth in such a way as to favor constantive social response. 2. For encourage relsanologiste to maderiake re-search in the bornd held relevant to seitmogenesis

search in the invariant receasing a strong it was and earthquake prediction.

3. To assist the development of corthquake prediction as a meany hold of testing by patheses of seismogenesis and of minigating earthquake risk.

4. To prevent scientific predictions being contacted in the public mind with predictions not based as releasing characteristic characteristics and based. an aclentific observation and reasoning.

5. To promote international cooperation and goodwill in the area of carthquake prediction. Formulation of Predictions

Considering this research of earthquake precu sors is now progressing from the stage of data col-lection towards the stage of hypothesis-testing, it le recommended that predictions be formulated in terms of probability, i.e., the expectation, in the space-innermagnitude domain, of the occurrence of an earthquake. The strength of the predictive state-

ment is then represented by the increase in the expectation, compared with that prevailing before the diction was made.

As a pseudction develops in the course of continu cus monitoring of the region, the expectation may be progressively modified on the hasis of further incrursory data or other relevant occurrences, so that the prediction process uself becomes continuous. Likewise the performance of the hypothesis can be communish reassessed. The region being muni tored will in general include areas of reduced expectation as well as areas of increased expertation and the prediction as a whole can, if appropriate, beresultly adopted as a basis for designing or modifying cardomake connectmensures in the region.

Scientific Evaluation of Predictions

Earthquake predictions need to have adequate support from within the celumological commanity before being considered acceptable as a basis for the formulation of warnings. Scientists should therefore seek to have predictions confidentially reviewed by their scientific colleagues and should ensure that such support is forthcoming before making them more widely known. In contaries where urganizations have been set ut

or designated for the purpose of the scientific evalnation of predictions, scientists who wish to put forward predictions should submit them to the relevant organization.
Scientille editors who are considering the jublica-

tion of papers containing earthquake predictions should take special prevautions to ensure that adequare support from within the seismological com-numity has been obtained to these predictions.

Communication to the Public and Public Authorlièes

Experience has shown that disorganized and connectoraductive public response may arise from the direct communication of an earthonake prediction to the news media. The news medlo ore generelly not the oppropriate means by which to ou-aounce a prediction. The author of a predictor hould miteael communicate the prediction confidentially to the governmental authority designated or best able to deal with such predictions.

At all times, crientists should exercise extreme care and restraint in communicating directly with he news media since the matter potentially afters the salery and soone onmuic wability of the popula from in the designated atten-

Predictions Concerning Foreign Countries Recognizing the serious problems that may arise from the prediction by wientists in one contact of an earthquake that may affect another country, it is

recommended that.

tilit predictions

ing a foreign country.

by the affected government.

in the prediction effost and in the evaluation of spe-3. Appropriate scientists and governmental officials of the affected enuntry should be advised of the prediction effect at the earliest opportunity, should be kept uderaned of the confloring resurch and should be nothed at the results sufficiently in adrange of their public release to allow for response

1 Defending scientists and scientific editors

ild gite eareful concideration to the potential

social and political effects of a prefliction order to

2 Every effort should be made to Involve scien-

lists of the affected country or region compensatively

Recommendations for Further Action

1. Considering that not all continues have narthquake predicting evaluating lextics, it is reconmended that UNESCO, in collaboration with IA-Si'l i, establish en international carthquake predic tion evolution panel or rester of experts which, upote request, will be available to assist any condity in the evaluation ofearthquake predictions.

2. Recognizing that scientists in one country may

need to communicate predictions to appropriate thornies in another country, it is recommended that UNESCO request car h member atate to designate en authority to receive earthquake predictions cutaugiting from other countries and to take any appro-

3. Recognizing the importance of objectivity, reproducibility, and rehability of preductions it is tecomneuted that PNFSLO and LASPEL be requested to convene workshops on algorithms for earthquake prediction and evaluation

1. Recognizing the surportance of terein applica-nois of probability theory and explorationy data qualyole to the formulation and eschuatom of earth-quake predictions, it is to commended that PNLSFO. and LASPET be requested to converte an laterno-thood accelling us this subject.

5. Since earthquake predictions will be effective in

reducing human and material losses only if they are ollowed by appropriate concert of action to reduce culnerability in the affected areas, it is recommend ed that PNESCO and PNDRO undertake a detailed study of the problems and lag in the response to long, medium, and short term earthquake predictions by civil defense and other relevant orga-

Meeting Partlelpants

C. R. Allen (PSA): F. F. Tuson (New Zealand), F. Fournier d'Albe (Liance), A. Giesecke M. (Perid. V. J. Kedis-Borok (USSR), C. Longitz (Mexico), G. Mader (USA); I. Rikitake (Japan). Nu Shao Nie (China), For USES(O) M. Hashizumie (Tratoc).

Announcements

Women Engineers and Scientists

The Bahimore-Washington section of the Society of Women Engineers will lost the 1984 International Conference of Women Engineers and Scientists in Washington, D.C., June 17-24, with wanten from more than 30 committee experted to attend and participare in technical and professional seminars.

The theme for the conference will be "Fechnology—An International Bridge." Among the topics will be transportation, education, agriculture, compiners, countinuoci-tions, energy, and medicine. Professional development sessions will also be held, bunsing an the preddents laring wanter in technical helds, the fulfillment of career goals through continued education, and management versus technical careers. For more information, contact Rusemary Markle, 9122 Barrle St., Manassas, VA 22110; telejdome 703-642-6035.

Groundwater Quality

The Serian International Conference on Groundwater Quality Research, spousored by the National Center for Groundwater Research and the U.S. Environmental Protectnon Agency, is scheduled for March 27, 29 in Tulsa, Okla. The grantiasis of the conference will be on the physical, chemical, and biological processes that control the movement and late of contaminants in the substitute. Paspers hace already been selected on topics toduding investigative methodology, bidogical and nonlinlogical transformations, sorption, and transport processes

Early registration for the conference closes March I, for further relocustion, contact Norman Darlann or Ann Redells, University Center for Water Research, OB Idionia State. University, 203 Whitehmst, Sollwater, OK 71078, relephone 105/621/6995

Separates

To Order: The order number can be found at the end of each abstract; use all digits often ordering. Only papers with order numbers are available from AGU, Cost: \$3.50 for the first article and \$1 00 for each additional article in the same order. Paymen must accumpany order. Depnsii acconnis available.

Copies of English translations of articles from Russian translation journals are available either in uncilited form at the time of their listing in EOS or in final printed form when a journal is published. The charge is \$2.00 per Russian page.

> Scull your order to American Geophysical Union 2000 Florida Avenue, N.W. Washington, D.C. 20009

Electromagnetics

O720 Electromagnatic Theory
NON-SPECTRAL REPRESENTATION FOR THE FIELD OF A
NORLECTRAL WIRE ABOVE GROUND
M.P. Carpentler (Centro de Análise e Processemenfo de Stnais, Complexo Ynterdisciplinar,
inetituto Superior Tecnico, Av. Rovisco Paia,
inetituto Superior Tecnico, Av. Rovisco Paia,
1996 Lisbos Codas, Portugali, A.F. dos Sentos
A rapreseniation le arror functione for the
current and field of a horinontal wire above
ground excited by a delta function voltegs
genorator le etudied. This tapresestation involves contributione Froe both proper and improper solutions of the model equation and
makes it possible to accome the reletive importance of proper and improper solutions in the

tance of proper and improper colutions in the radiation mechanism. The new representation requires the analytic continuation of the fleid transforms into Phe whole complex plans of the transverse wave number which is studied for the first time as far as the improper half-plane is concerned. An asymptotic approper for the radiation field is obtained and it is shown that the principal improper mode provides a good opproximation to the far field.

11d. Scl., Paper 450186

DIZO EIGENEGRAÇUEN THOM THE FRECTILT DERIVATIVES OF ELECTRON AGNETIC INDUC-Nan D. Chure Until tipe of Fleophysics and Planetary Physics, University

Aim D. Chare Unstatuse of Heophysics and Plantestry Phisors, Unionary of Lubrating at San Diego. La holis CA 20201.

The Frechet decreative of the fundamental toroidal and poloidal magnitude routes of electromagnetic industrial are manimed in detail. The response fundamental electromagnetic industrial and Frechet fundamental to Frechet fundamental interest of the mode are shown to be Frechet deferminable in an L₁ norm for general conductivity structures and interiors source integering consumental mapping the Persiphologic fundamental for model Green functions are demand used to crambin the Frechet kernels for a vedicor controlled source and a Kelvin was model. In both reach, the TM mode powerses, superior resolution usbilly, especially for loss relative mediants a conference and epith. The results suggest that inhaumen by the secon tales can see deathed of the laboration factory, inverse theory. Friching defining and deniminat I. Geophys. Pon., N. Pauri 400111

12.1 mm) from high militude inrough near, cloud conditions, can be used to delineate the scale eige. Socials polynyms and leads, neature les concentration, determine let type, age and initionate and to quantify the sop surface wind and straspheric properties. In it is inages were also obtained at 25 MM 11, and two lear index of the continuous clear attraspheric conditions. The location, movement and concentration of the scales edge greatly affects the dynamics of location circulation and air—man infection. This information is fundamental for securate long-term weather prejiction and for anip operations. Them are not first destructments of two locations and an accordance to the dynamics of the scales of the continuous content of the radiometry, marginal ice zone, mil-weather).
Pad. Sci., Paper 450131

radiosetry, marginal ice sons, sil-westher).
Fall, Sti., Paper 450131
0799 General Electromagnatics [Magnetotallurics]
A STRAILEO MAGETOTELURICIANDIOMAGNETOTELURIC STIDY
OF THE JENEZ VOICANIC ZONE, NEW AFFICO
Mark P. Ander iGnophysics Group, Los Alawos Estional
Laboratory, Los Alawos, No. 81551, Ron Cost, and
David U. Peranguay
The Jenez voicanic zone is an alignment of late
Cenoacic voicanic contest located in morthern New
Marico and Arizons. It Frends MSY P and is -VOO No.
In length. Previous investigators suggest the zone is
massociated with alevated heat (low and anomalous): low
P-wave velocity (rec. 25 to 180 he Pepth ensuved along
a line from Hount Taplor to the lenez Mountains. It
may also be associated with a Precambrian crustainage
boundarg. A detailed study, consisting of its audiomagnetotaliuric IANTI and 21 magnetotelluric IMYI
soundings, was performed in a 161 km area located
'50 in to the oorthwest of the zone center. The ANT
soundings were used to detact any near-surface
sinterical structures or lateral variations. None
wore jound, although terrain effects near the edges of
wassa were observed. Agreement between the ANT and MT
results from IT to 99 On was excellent. Plectrical
artite direction is undefined at less than I a period.
Arom I to 100 s, the average ripper atrihe is cin'u,
sligning with the dominant surface a tructures.
Breater than 100 s, it rotates absuptly to ~550 k.
This direction represents the electrinal strates within
matmorphic Presentivan beament rocks and suggests
control of the deep sterrical structure hemseth the
study area by the Jenez none. Two-dimensional NY
modeling indicates three relatively homogeneous layers.
The real-activity of the deeppet layer, 215 fin depth, is
No Ohme in the northwest but decreases to 5 ohmes
southeastward, towarf the sone. These results, picus
southeastward, towarf the sone. These results, picus
southeastward, towarf the sone. These results, picus
southeastward, towarf the sone. Two delementonal to
southeastward, towarf the sone. These result Jease tong a manufic at shellow depths relative to surrounding regiont. Ragma intruston along the zone is the most probable amplanation for this anomaly. (Ragmetokalluric, adjouagemetokaliurin, Jease velcanic . Geophys. Res., J. Paper 450141

Exploration Geophysics

1920 Exploration Geophysics (Maynetic and electrical uplo Exploration Geophysics (Maynetic and electrical methods)
Regound Magnitic Suprey in Int. Code RAMoh. CALifordia Geophys Magnitic Suprey in Int. Code RAMoh. CALifordia Geophys Center. Cetina Lako. California, 99551
A ground pagnetic study eas compined in the Interpretation of the Code of t J. Geophye. Res., 8, Poper 3P17b2

of the earth is a gorential field in this case, and using well-established patential field theory. It is known to be possible to predict this reaponic of both horizontal components on any plane from a complete theory is the restricted or government on the sample of the restricted or government in the sample of the restricted or government of the exemptation in a sample of the investment of the exemptation of the sample of the restricted or introduced in this framilious at long a partial allowing effects which depend upon the apparial allowing effects which depend upon the areal estent of data coverage.

The major source of noise in EM survey data collected in resort areas is sferic activity, which arises from the worldwide Estatibution of lighting Alachages. Sierac noise, although time-varying, is predominantly unitors in a spatial sense, with local spatially varying anomalies near conductive inhomogeneities. Since the horizontal component noise amplitude is typically an order of magnitude, a strong case can be nade that it is advantageous in course accepts to increase the spatial coverage of vertical component data rather than to read both horizontal components.

COPPRISE, vol. 49, No. 1

OPIO Seimit methos:
SOUCH SPEAN AND ATTERNATION MEAPUREMENTS IS OASSE
PROMERTS IN THE COLE OF METHOS
TROMES C. SSrington ISLANDS Sectional Laboratorian,
exploratory Pyatens Division (SZI, P.O. Son 5800,
Alboquerque, po 4(185)
The spend and attenuation of sound in gasar marine
septents is the Miniscippi delta area have been
measured by means of small (I to 800 mg) suplusive
theree hories 10 melow the mod line. The respective
values obtained were 900 myeec and 1.4 PF/ARr-m.
SITective gas content was estimated no he approximately
0.008 percent.

Oggo Seismic Methods

182 MATORE DI SEISMIC SEITECHOMS SHOW DEEP CRUSIAL

ANUL ZORES

Intry 9. Jones and Amos Mar (Ooch Phynics Project,
Department of Geophysics, Stationd University,
Stanford, Californie 94305)

Deep colsmic reflection profiles have recorded

reflections from ductile thear runes eithin the
crytielline batement. Fortheps the best example is the
EOCOMP Wind River line in Myoning, which shows the
Wind River thrus 1 faul to be p strong reflector from
the surisce to deplan of ebool 30 liloweiers. In
Identify the physical properiles requestible for the
subject reflections from feuly zones ee report secturesebats of compressioned wave volocity and veitouity
selectorapy in symmites recovered from ashumed ductile
sheer somes. These rocks erre charactarized by extensive
ductile deformation of plastic minerels, bright
detormation of the some religid minerels, primate
detormation of the some religid minerels, primate
detormation of the some religid minerels, some significantly and systematically belawen Phenylamites
end in adjected undeformed rock. Seitmic smilloppy
of Tan greatipe to present in soverel mylopites
dependent epon their composition end fabria. Using
our dats on eylonite properites and models for Pho
cruted tiructure near tha Mind Pivor liee, we compete
true amplitude syminetic religions spisnowan and
impare them to inverse abructure of the idual come at
considered, our modeling ladeoter fairty strong
reflections irom mylonito zones in mais cases. Me
stoo show that elevered pore pressure in shesn zones
say produce strong meller lyngs. However, e permanshilly on the order of 10 decay is redelined to
maintalle sufficient, pare greature to produce a
velocity encody in a figul zone which he; lend been
inactive. (Mylonius, Seismic Velocity, Seismic
effectiones, icelt Zone Structure)

1. 11-phys. Fess. D. Cape c 1800/15

Olio Welenit methods
THE Stonation of Common Storolet Stant Stacks
Sichard Octoical Identianne of Comphytics, Stanford
University, Planford, Ch 94055 Jan F. Clemboat
Sellection selenic data can be imaged by magnating
common midpoint elent stacks. The basic method is to
neached slad stark sections from the stant stack of
noth common midpoint gather at the name ray parameter,
Seeling investigators have Pureribed migretion methods
for slamt stacked abot, profiles or nommon receives 9773 Secots Sensing
ALL-VETRER HELERIFO-MATP EXACET 19 THE MARGINAL ICE
A. P. Hollloger ISpace Sensing ipplications Branch, Code
791; Mayal Sudarch Laboratory, Verblagton, G. C.
203751, B. E. Proy and M. F. Hartsan.
10 a recent merits of flights over the merginal toh
11 a recent merits of flights over the merginal toh
12 a recent merits of flights over the merginal toh
12 a recent merits of flights over the merginal toh
13 and 14 a recent merginal toh
14 a recent merginal toh
15 a recent merginal toh
16 a recent merginal toh
17 a recent merginal toh
18 a recent merginal toh
19 a parameter,
10 parameter
19 parameter
19 parameter
10 parameter
19 paramet

Announce it in Eos

- ◆ Positions Available
- ◆ Special Meetings
- ◆ Services

◆ Supplies Read every work by 16,000 AGU members worldwide, Eus meets

◆ Student Opportunities

For advertising rates and copy deadlines, please call: Redun I:. Little, 800 424-2488.

your advertising needs.

E102583

theoretical PitsPrentage is that shere is no exact theoretical PitsPrentage is that shere is no exact theoretical patching variations.

Sinct mack algoriton is a method of "algoriton before stack," it noives the dig rejectivity growine of conventional starting, gerticularly when harlsunful reflectors. The sarrow hashing of all Pits also tapropes termal reduction is the image. Sinct stack signature growides a stractionard section of measuring interval reminding alter signation the store of measuring interval reminder and restricts to research the translation of alter accurate for postratical fractions and reflections. These avects translated into a post surface with the additional diseason of also into the patch into a degrination equation converts the pat surface late a degrination of alless of 64% are also a degrination of areas of 64% are signalion in senural, the silects of Bip att

0930 Seismic methods
TRACELTIMP INCESSION OF OFFSET CRILICES SEPERIC
SECRETARY INCESSION OF OFFSET CRILICES SEPERIC
SECRETARY INCESSION OF CONTROLS, 404 J.D. Covery
Travaltime from an offset vertical eniamic profile
(VSP) are used to entinete subsurface too-disensional
slip by applifieg an itempies lease-equares invertee
method. Tetts an apparente Pate desmonstrate that
lovension techniques are capable of satienting slips le

4 1 1 1 2

essential wherever the ratio of soutce offset to inter Sagth hacomes small. Travellist immersion also toquiran esselul estimation of layer value is see see grager seatter corvertions. Aside too these difficulties and the ubleuters conceptqueness problem, the VES termities layer now were able to ground a velid earth model for seate on a residence.

Geochemistry

This coemistry of the Assumptions for barrelay productive Calculations for can such the annual of Calculations for Crake the property would be able to law Bishop Hiltest Conjectation, 25 feeterly St., Buffith, 27 142701 and William J. 1814 A cotherployy is described for combining infinishing an again seasoble beam server.

Agreement with intailed and a reject collections by stong the full being named formulae. In the terrosphere, a spain is 147 app [-1,44] and [-1,47] at 1019 day metabolism. principally and first and a point of motorcies will make a precision wetter than 10% and in the managers, angle play a point is procision. The process of th the better the tending the tending of the legal, and the better that a first one planet of the legal of the l think of between 115 and 200 me and on the and other translator utimogene and time article of or his bounds of an him.

Equation for the second of the

1.2 Constant of the property waves to the transfer to the property of the state of the transfer to the particular following of first tradition from the property of the state of the property tradition for the property of the trade of the property The first of the control of the latter and the series of the control of the contr The first term of the enterior in the enter of fading the first form fit a five model if a the major term of the first t

The Bush many I.M. Income claratement of Geology and or Shar you will excell to the Makes, uteben, Amberet, Many of the Committee of the Commi and a Sig. of "Historia" of Matter than, America, we are all states of the American and American and the American and Ame

A control of the control of the property of the control of the con the first of the property of the control of the con As the control of the

1990 for holy due to -co statements to prevented Saver Marshand, Artfabilla Informate, and Leaneth & Loddig (15.5. impligated Surveys, Spides) Crater, Ser. 2006; 16 185. heavy, Colonaly Silili Crater, Ser. Crestopes rempeditions to result befrantly and surrected and surrected fine state and surrected in select to Saveys in the Surveys in the surrected for Surveys in the surrected fine surrected for Surveys in the Surveys in th

tean & From Batter

isotopic treter to geological processes. Going to the lew abundances of '1944 and '1966 in mature, our sessutances of '1967/406 ratios of actural complex leve teletively large (00.0181 artote, and the satistica in Ce-indepe ratios were barely resolved. A tensous anticoteletion was observed televes of Ce and '94 for terrestrial basels and granites, indicating that with some improvement in smallytical incheques the Ce lectopic compositios any prove useful as a tracer for geological processes. A very low Ce predicted iton the Ce anomaly in the RES patern of the Sobart 13 chondring (Sadassura and Meruda, 1971) was not observed in this study. (milicating that the Ce anomaly may be caused by representation the install of a situation. A low 'Ce anomaly may be caused by representation the content of the study. retrestrial contentation or alteration. A low of sessional of or the source of Rabble is consistent of out previous sailants Nebecote et al., 1961 of a 1980 depleted source. (Ce indepen, te-Ce, Co

A rethorology is described for combining current information or anne postubilities and some strong analysis of the social information or anne postubilities and some strong analysis. This approach, known as byos analysis, but for an analysis of the social information in the following in the content around of the social information in the social informatio ejection rate of pauliur to the Javien pinema is of the order of 10 stoms/cm²/sec, that the erosion the order of 10" stomp/cm'yase, that the arguin rate of Iceah Sn, deposite due to equateting to the the order of 10" (m/year, and that only for page-traling ion benbeddent can a significant, and possible observable, column deceity of 803 be produced in an 802 front.

J. Geophys. Res., S. Paper 185121

Geomagnetism and Paleomagnetism

PRICOMAGNETIS IN

2071 General (Ophtolite Magnetic Properitar)

MAISTIC FADERIES OF THE BUT OF ISLANDS OPSIGLIS

MAISTIC FADERIES OF THE BUT OF ISLANDS OPSIGLIS

MAISTIC FADERIES OF THE BUT OF ISLANDS OPSIGLIS

OUTER AND INCLINENCES FOR THE MAGNETIMITION OF

CHARIC CRUSS

B. Ann Swift IU.S. Geological Burve, Voods Hole, MA,

02583), S. Saul Johnson

Locu Expressio propertial, opsque mineralogy, and

degree of antecorphise were determined for IPI

unripriled Sumples from the Sorth from and Slow-Na-Down

mastife of the Buy of Laisends ophicilite ecopies,

MacCondiand. Ine weatered and metamorphosed

extrusive bestill subglean have a work, secondary

mastife of the Buy of Laisends ophicilite ecopies,

MacCondiand. Ine weatered and metamorphosed

extrusive bestill subglean have a work, secondary

mastife of unanom origin. The initial magnetisation of

file underlying sheeted disc copies appears to have

been destroyed by hydrothermal electrion acon effort

forestion. The manufaction intention upper metagnetic

earlies in conservative, and the degree of electric

Because cagnetistion of the catagaboro samples in

related to mospermative, variable elteration, thous

crutial units are unlikely to make a significant

contribution to lineated sagnetic ancessible. A

capitation of our results and other studies augustant

a cotel in which desandenerus sagnetiastion reveits

fires an oppor extrusive beautic secure layer, recipily

1.00 islick, with no confiribution from a deeper source

layer recognistic from these But of Islands data.

1.00 the security of the securi

2' or now was that magnetism, plate factoring) to strong, plotte from Mo. No extend of Memorism of the six markets will be from Alega

Contrained to protect and a second of the protection of the protec

J. ce plant. Pers. 2, Paper -BOINS the General Imagnetic properties of minerals; compared acceptance of a reasonable for incomparities in the Heaville Applies of the English Country of the Landon (Free English Country, Mouseon, 1s. 1995a).

C.S. Leaves (Free sigh/MSS-Jer, Mouston, IE. 1998).

G.I. Sares

In one electron-region with solution sprins, concastions once liganite-rich shan indicent sprins, concastions once liganite-rich shan indicent sprins, concastions once liganite-rich shan indicent sampler that
ye have a shared in he paramagnetic at some temperature,
ye have a shared in the paramagnetic stronger that
ye give real shared or remanded the conference ment
of an indicent spring of the shared in the paramagnetic field shared
years and the managnet remanded in the paramagnetic shared
years an employee, the the halfs of temperature of the paramagnetic spring all property continuously an important component relative in the null
temperature of the spring component relative in the null
temperature of the spring temperature from the property
carrier of the Strille remanders, there are property
datast from give quenching from the Synthesia vencutature (formed give quenching from the Synthesia venprotein shared the disease, and the sampler condend through the
property of the strong strong paramagnetic strong strong paramagnets of the paramagn

Hydrology

III's fooding and evidentiation graphs of the control of the contr

acceptch Contest, Segathancest Company, Not Satings, Atreasms, figott.

Claract herest and situ preparation, which included stuching the residuat vegetation, broadcast bucked ded content of the sating of the of the s

Geomagnetism and Aeronomy

Volume 23. Number L

Churskheliyan A. N., Churokheliyan T. N. Zonni modulation of cosmic roys and the goueral magacile field of the Sun Ivanov K. G., Mikorion N. Y., Khurshilludzo A. F. The time of un isolated shock wave ranning from the Sun to the Earth

Genkin L. G., Ernkhiere L. M. About influence of ion-sound includence on processes of framport in solar wind
Miacov Vo. V., Spir'kovn E. S., Shesionalov I. P. Buchront strongs of electrons with energies of 0.03-3 MeV and their spectra by the data of the ASE aProg-Valolozkin V. I., Danilkin N. P., Denisenko P. F., Faer Yu. N. Empirical allitudinal dependences of effective frequency of collisions of electrons in the middlelatitudinal lonosphere

Rozuvoov O, I., Sheshukov S. S. Herizonial redistribution of lumuspheric lons ma-Rezuvoov O. I., Sheshukov S. S. Herizonial redistribution of immagnetic lons mander the influence of longitudinal currents.

Liu Van Llong. Procession of ionospheric dain by order statistics and the dependence of ionospheric peromoters on the soler activity

Tushentzova I. A., Tzedlina E. E. Multifrequential model analysis of the conditions of short woves propagation at the trase Nikolaev—Havning

Tverskoy B. A. About rediant forms of auroroes

Dubinlo E. M., Zakbsrov A. V., Plancenko N. F., Lundin R., Hullqvisi B. Observetions of eccolerated lenospheric ions at auroral force lines at (3—6) R.

Durchlevo L. A., Ivanova T. A., Kovrigian L. M., Sosanovelz E. N., Tverskaya L. V.

Dinguestics of the magnetosphere state by the date on the solar cosmic rays Dinguostics of the magnetosphere stute by the date on the solar cosmic rays Bespalov P. A., Wagner C. U., Grafe A., Trakinengoriz V. Vu. About formallon

of s gap in the electron compenent of radiation holts. Alexeev I. I., Belenknya E. S. Electric field in an apon model of the magnetosphere Bleickovn M. Interplanetary magnetic field end geomagnetic activity in the 20-th solar cycls . Gershenzon N. 1. About recovery of parameters of ring current by variations of of the nugnetospheric convection and polar ionosphere .
Gullelini A. V., Zololukhino N. A. Estimation of the size of the region of protos Gravin V. O., Karnsik A. M. About the spectrum of energy density of the ocean magnetic anomaly sources with irregular eprooding.

Braginsky S. I. About short-periodical geomegnetic secular vertetions.

Zignyl G. F. The nature of regional 500—600 year variations of the geomagnetic field.

Bledaov V. A. The choice of algorythms whom realizing the modul method of defining the magnetic field compounds

Bonkovn N. P., Bondar T. N., Kolomittseyn G. 1., Cherevko T. N. Presentation of the main geomingnetic field and its secular variations by the model

Briel Informations Ivanov K. G. The magnetic axis of the bipolar group and the speed of interplanetary plasma . Papiloshvill V. O., Gromova L. I. Variety of the interplanetary magnetic field hi the cycle of solar activity
Percyasiova N. K., Pokrevsky P. E., Stozhkov Yu. I. Dependence of chemical com-Percyasiova N. K., Pokrevsky P. E., Stozikov Yu. I. Dependence of chemical composition of galactic cosmic rays on the general magnetic field of the Sua by the data of stratospheric measurements. Pakhonov S. V., Gorbanov A. N. Profiles n. (h) of D-region of imasphere of the equalarial zone, measured in the period of solar activity maximum. Borlsov N. D., Zoloharev I. P. hallmence of the ionospheric skin-offect on excitation of Alfven waves during the periodical heating of the ionosphere. Zhiltzev A. V. A passibility of prolongation of time of work of engines in the presence of gradionis of faF2. Yukhmalov B. V. To the theory of radiowave capture in the ionospheric channel during the multiple scattering. during the multiple scattering

Gorbunov S. A. About intensity of the electric lieftl near a rocket Akishin A. I., Akimenko S. V. A double probe of a high potential in a rarelishi plusnia . Grelecinnia A. I., Kurzkhniin E. G. Alaust field of specifs of the largesculed wind Sergeeva N. G. Obsarvation of radiometera in the day casp

Varzhenko O. T. Twilight emission H₂O+ near 6704 A

Mutvoova O. A. The spectrum of Iwilight emission H₂O+ near 6704 A

Sobolev V. G. Spectraphotometering of twilight emission H₂O+ near 6170 A

Plsarsky V. Yu., Rudneya N. M., Fel'dshtein Ya. I. Highspeed solar wind — a nocsssary coodition of geomagnetic disturbances

Cudovkin M. I., Shukhiling M. A. The role of reconnection processes in generation
of cleetric fields in the magnetespheric tall

Plsorsky V. Vu., Rudners N. M., Feldehlein Vn. I. Energotic characteristics of solor wind and intensity of goomagnetic disturbances

Nozarelz V. P., Sergeev V. A. Dopomlenco of Iroquoneo of appearance of Pt2 pul-Sollons on pornincters of none-Earth medium

Butloov G. L. Babkin E. V. Magustic unizotropy of sollid solution 7-Fo-O₁—

Fe-O₂

Fe₃O₄ Letters in the cilliorial hours

Grigorov N. L. On the origin of the electrons in the environment of Saturn . . . 450

was mail and short-lived. (Stiviculture, watersheds, pask flow, suspended solidg). Mater Somour. Ces., Papor 141994

JI2) Glaciology Tice core emplyees TROPICAL GLACISES: PUTENTIAL FOR ICS CORE
FALEGILBATIC SECONSISUCTIONS
L. G. Thompson finatitute of Solar Studius, Ohio State
University, Columba, Ohio 412[0], B. Moniny-Thomspon,
f. M. Grootee, K. Fourcher, B. Hastacrath
The potential of trapical glaciers and the cape for
the teconstruction of part climatic conditions by the
analysis of life and the Cores is evaluated. Samples
from Fits and cores retrieved on three same fields in
the Boath American Addes are compared with results from
the bodius in East Africa and Indonsta. Measuroments
include the discrepantials concentration, companies ice bodies in East Africa and Indonesia. Measurements include the altropartials concentration, oxygen isologic abundance ration, and total buts radiotactivity. The Queictays ice Cap contains the bost prosessed annual signal for all three perasters. Beriler work buggested that so ice cote to Androch should contain a tecord of 600 to 100 years. This inference was continued by drilling to bedrock in 1995. The Queictays ire Cap in the eastern odgs of the Peruvian Andre Managerish the Cap in the eastern odgs of the Peruvian Andre Managerish the Cap in the eastern odgs of the Peruvian Andre Managerish the Cap in the eastern odgs of History and Interpretable tecord of climatic conditions within the capped subscopes. J. Sarabya. Res., C, Paper 400091

() or treamily ster to calming the Tanaspect of Hoverschaffing Commandants Fore an Other Fit & Appeting Short Colleged (Chronic College College) Interaction of Hillingto, 200 to Redmo St., France, 1 April 19

In the state of Hillingto, English to harde St., FrBana, it there exhibits have traditionally used distribution will be into tight to describe the rate of mirration of croin, centuring the ment in such cases of motion controlled to the stidies of the figure in outchange, and beverand the validity of the figure in outchange, and beverand the rempited by values in such cases are not conjunt erves an advancing actual front. This report decades into the case has ment attacked the respect to the figure in order and. "Affactive" ky which yet there is no charge a remaining the stilling of t never raide the first year failouting Scattant and C. Booking and S. Per and

BIJO Groundwatet
FRALMATION OF THE SKIN EXPECT IN BLUC TESTS
Charles 0. Paust and Inpen W. Parcer (Geoffens, Inc.
100 Fldan Street Macdon, Virginia 21070)
Illidrautic properties for low-parasability farrations
are often estimated using elug cests. If the well in
which the iests are conducted was defilled with stilling
fluid containing mad, then investion deenga may have
accurred. Buch damage may result in alog sest interpresentions that yield estimates for hydraulic properties
that are representative of the damaged tone, as upposed
to the formation inself.

Uater Pasour. Res., Poper 192001

3130 Groundwater
OPITRAL ANNUAL OPERATION OF A COASTAL AQUIFER
U. Should | Faculty of Civil Engineering, iechnion isroel institute of Technology, Holfo, isroel)
J. Cher and A. Gamlis!
Optimal annual operation of a coastal aquifer is
obtawnined by using a multiple objective linear
programming model, based on a multi-coil model of
the equifer and a mathematic representation of the
hydroulic distribution system. The decision variables are pumping end/or recharge quantities in
each call. Four objective functions ore based on!
|1] s dosired groundwater surface map. (2) a detired locotion of the soa water-frosh water interiace
ion in each chastel call. (3) a dosired concentration map of a selected concervative contaminat,
and |4} minimization of the energy for pumping and
recharge.

An approximate important accounts for the 3130 Grou An approximate innorized expression for the location of the interfece has been developed, to emble the use of linear programming as the opticization method.

emble the use of linear programming a sation method. A trede-off procedura is employed for identifying the most durinable solution. The modal is spolled to a secment of the coastol aguitar in israel - a 44 km strip along the coast with e width of 7 to 150n - and results ore discusard. Vater Resout, Boar, Paper 191990

SI40 Limnology [irradiance distribution: A METHOD FOR COMPARING SCALAD IRRADIANCE MEASUREMENTS WITH UPWARD AND COMPARED IRRADIANCE IN LAKES C. B. Spigel Tubet, Civil Englanding, University of CanterBury, Chilatchurch | Mew Zeplandi and C. Borard Williams

NATO Spou and ica INSOLATION TOPOCLIMATES AND POTENTIAL ABLATION IN ALPINE SEW ACCUMULATION BASINS; FFORT PARCE, COLORADO

J. deophys. Ros., O. Paper 490089

INSOLATION DASLING: FORT PARCE, COLORADO SALPINE SEMA ACCURALATION BASING: FORT PARCE, COLORADO SALPINE SEMA ACCURALATION BASING: FORT PARCE, COLORADO SALPINE SEMANTICADE AND ACCURATE AND ALPINE SEMANTICADE AND ACCURATE AND ALPINE SEMANTICADE AND ACCURATE AND ACCUR of radiation melt should be based upon average diura crajectories of solat transmission if reasonable satirates of potential haste melt are to be achieved for alpias areas. Cairous Impolation with Water Fescut. Res., Paper 440022

3170 Snow and 1ce AN OVERVIEW OF PASSIVE KICROWAYE SNOW REYEARCH AND

AN GYRWITW OF PASSIVE KICROWAYE SNOW RETEARCH AND RESULTS

J. L. Fatter | Hydrological Sciantas Sranch, Code G21, Codero hate Flight Enter, Granbell, Saryland, 20771), C. S. Hell, A. T. C. Chang and A. Rengo The Current slate of tonatode of the mitrawaye properties of snow is discussed. Theory behind the microwaye amission from snow is reviewed as era the physics processes of snowpeck outcomorphism. Flaid, airread ond satolitte pastive microwaye data have been acquired and analyzed for more than 10 years. Results have repeatedly demonstrated the feetbility of amploying multilrequency passive microwaye data to study enon-covered eras, anow depth and interest snowpeth properties. Resultion emending from the ground demost in snowpeth a eaction of the snow trystals and concurrently the sear limit radiation all microwaye irequencies. Thus, the addiation emerging into the anompath is the result of o tomplax series of interactions both within and beneath the snowpeck. Suture sludies accommended by a succept his properties working group cessioning and outerfill, Recommendations include performing optionality Submittery resourcements using real and artificial more to be coordinated with Learnelical modeling and oircraft overfilight carrying passive microwaye Intermentsion. This is considered necessary to order the hip to interpret the distance rende earnings. lay, Geophys. Space Phys., Paper 40095

\$175 Soil Molecure
THE OPERATIONAL SIGNIFICANCE OF THE CONTINUUM WYYOTHE\$15 IN THE THEORY OF MATER MONTMENT THEOREM 99149 AND AQUITES
Philippe Seveye 10epertment of Soll and Environmental
Sciences, University of California, Civeratia, Cali-Sciones, Datvorsity of California, Creerates, California, 92521) and Garrison Specito
The appractional meaning of the Representative
Electropy Volume (REV) concept, on which current
localational theories of water novement through person
mails are based, in analyzed criticality. It is concluded that the REV concept he applied to red prove radia ora based, in analysed critically. It is concluded that the EXY concept as applied to real percentional is both unnecessarily restrictive and exertinguished in the place, a relativist concept is proposed in which recreases the relativist concept is proposed in which recreases the hold early partial and interest and include an convolution products of ball-racepy interferences among experiental measuring devices, now recognized as critical in the assessment of spetial variability in the proportion of activated and equiform, can be incorporated naturally within the relativist concept, but are establed a priori in the RFV concept. The relativist point of view, unlike the PEY concept. The relativist point of view, unlike the PEY concept, lays a clear operational reconstruction and tender to be provided and the properties of the

Katar Power. Ros., tapar 3W1992 Meteorology

3710 Boundary lover etroctures and processes TRADENME OF OCCUSE BY PURSULEME AND FLOURS IN AN

IRATED AT OF OLOME BY DESSULENT AND FIGURE 12 AN IRATED BOURDARY LATER (18/2), 323 Grondwar. On the combat 1970A/CRI 18/2), 323 Grondwar. On the combat 1970A/CRI 18/2), 323 Grondwar. On the combat of F. Pepelf.

The turbulunt fluves of oxone and latent and mensible is at are computed from funt-response Community and the surrounding suburbs during the afterness and exeming of 2. August 1970, in the attorness, the stone or in or 2.2 August 1970, in the attorness, the stone full of 2.2 August 1970, in the attorness, the stone full of 2.4 August 1970, in the attorness, the stone full of the telepost manifold the following the first of the community of the order of the community of the order of the community of the order of the concentration at 200 m processes to 35 pph by early evening. The normalized variances and spectra of vertical velocity, temporature and order show little change with leadyfu or totalion in the order conditions and markheart suburbs during the afternoon, in good agracement with normalized materiates obtained over rural terrate. Best from a cloud ponetration by the afternoon in the subtract is used to extinate a nean updraft velocity of 4.0 s and as updraft area of approximately 1 km. The flux of come due to the note notion in the subtract is two orders of consultate in error than

Retearch*, eoulder, Loterado 80007 and 7...
Limarman
Atrospharic bydrotorbon measuratenit from renote etece
are presented and analyzed to dotermine soutes of
ambient mining testes. Blomass burning oppoars to mak
major contributions to troe tropesphoric hydrocarbon
burden avoc tropical forests and grosslends. Blogenic
entialens contitude o longo percentego of the atmospheric hydrocarbon volume in continguial oreas of
significant productivity. In marine eroas tudied,
omblent hydrocarbons may include contributions from
ovaparation of distolved hydrocarbons trensported by
Ocaso curreots from eroas of coasol upwallings or
marine politation. In all cetea, hydrocarbons, from
local sources ore major components of the atmosphetic
hydrocarbon composition. [hydrocarbons, continented]
marine, tropics).

The difference between the summet and winter observations are not solely due to changes to photochesistry but require consideration of etratospheric dynamics. We correlate the reduction in NO. In winter with the production of N₂O₃ in regions of little or no insolation followed by transport to Cold Lake. The unusual profiles are shown to cosult iron air masses at this frant sittudes having eighbe different origins, e.g. polar or mid-issitude of different transit times from the neutre to the sampling point. (sitrogen oxides, seasonal distribution, stratospheric chanistry). Ostashey V. E. The Small Perturbations of the Atmosphero for One Model of the

J720 Climatology
THE CARGIN AND EXPLIEST STATE OF THE EARNI'S
HUDRISHIPS
J. Graham Cogliny (Cocymaphy Dopartment, Trant
University, Potentiarough, Ontario, CARGA 131 782]
and A. Henderson-Soliers
The origin and carless history of the Karthie
Enthropheric - the group valuation & discuss The origin and carliest history of the Karth's hydrosphare - the access volatiles defined by subset in 1991 - can be constrained by subseted into setrophysics and quology. Models for the evolution of the Softer System and for the growth of the Earth suspest quite strongly that the hydrosphare came into being during acrostion. Its formst, with 11.0 resulty in the oceans, CO, mostly in sodiments ofth a residual atmosphase individually 87, CO, and 110, as eachablisted very carry and has pecsisted without destabilizing climatic excursions. Alternative accounts of early history, in which the Earth either loses a measure primordial atmosphare to acquires its econolary sumaphore by gradual deposing, now seem improbable. It is difficult, for example, to dissipte a measure summephone in reasonable time, and gradual outquesing some to be ruled out becomes accretion was a highly energet process. Several geological iscop systems which can be sumpled today require early supration of the atmosphere, and probably the hydrosphere as a stepted boday require early suparation of the atmosphere, and probabily the hydrosphere as a wholey these isotope systems also suggest an early origin of the blosphere. Coolegical Indicators of atmospheric composition are also consistent with an early hydrosphere having an initial neutral or weakly reduced demical character. Such a strengthere having an intitial noutral or weatly reshood chemical character. Such a hydrosphore, varied by a least lentacea early Sun, appears to be climited in the test of the present day if the sajot hydrosphore constituent in liquid star. A near-global occur and a cleasy stamphore satility to mitatin actuality against the period of the "deep becare" and the "tomony accuracy" targe quantities of situacylet for chemical grounds good are not registed for chemical procedures good are not registed for chemical actuality, although CO2 may self have been present in amount a larger than the picture shich we present, to the continuous probably did not different have and it here in goodenied into any. Investigated that the continuous probably did not different have and it here in goodenied systems. Speechart of accuracy consists overlands ovolution.

1720 Scientifles Circatole, 3 A 90001 Of Oxford Isologi ConferHibs of PROCEI-IATION IMPLICATIONS for PAIS-CHIMALI DATA Curt Corey and Philip I. Hansen in Charlond Conten-for Acomphesis Presenta, E. O. No. 1909, Builder, Colorido 803011

for Agrospheric Passar L. P. C. No. Nov. 1990. Boundary, Calculate 800-013.

The marky of respondences passar plantal and responding on the second state of distance of the second state o bound as layer and the final lipication of the con-taining state the fee sheet. After measure the watch results with in the arm time the present of draw interpretes about the particle to present of quantum of the feet of the arm time of the con-ception of the large to the measure that it is feet are consistent with a particle of the particle of the are consistent with a particle of the particle of the probability of the large that the probability of the con-ception of the feet. I. Greglen, bee , D. Peper alline.

3790 Instruments and Techniques HIMBUS-PAPTH RADIATION SUBJECT SETSON CHARACTERIZATION FOR HIMBURD DAVA PERSONAL PROPERTY. FIDELITY
R. Masehhoff (Gulion Industries, Inc., 6000 Gulfon Court NE, Albuquerque, 181 871091, A. Jalink, J. Hickey and J. Swedberg
Datailed characterizations of flight spare eatch flux someone from the Himbus Earth Radiation Sudgat (EPB) program have been performed which, when coupled with a Pote careful accounting of the orbital instrument environment, provide the potential for greatly improved accuracy in the finel data products. The characterisations included dotation for mappingar, responses to itansient long and Improved accuracy in the rise data product. The sharacterisations included dotailed FoV mappings, responses to itanelent iong and short wavelength radiation, and response to sensor tumporatura shanges. These consor and environment theresterizatione, siong with the outstanding ion noise and stability properties of the ERS instrument signal processing eyetom, promise to improvement of the date arturacy to lovels sufficient for long term budget and trimatologies! purposes. The combined data seets from Rimbus 6 and 7 are expected to span a poried in messes of 10 years. The improvements in data actuately are particularly significant over sonal jetitude bands because the corractions are shown to be atrongly latitude depandent. 19 od latice budget. eoneote). J. Georbye. Res., O. Papor 500040

very Lal velocity, temporature and veloce alow little change with height or Location in the urban center and accepted by the Location in the urban center and accepted by the statement with normalized motivate over trual toratain. But a from a cloud ponetration by the discretic is used to magnificate and approachated by the statement of the updraft to two orders of magnificate interactions. It will not orders of magnificate interactions the terbulent oddy flower within the cloud.

J. Gaphym. Res., O. Paper ADDIB2

AND RAFRIE ATMOSPHERS

J. P. Greenberg [attional Center for Atmosphoric Research*, Coulder, Color and Support of Atmosphoric Research*, Coulder, Color and Support of Atmosphoric by drotorbon measurement from remote attend burden avoc tropical forcests and grossiends. Biogenic continuing the continuing of poars to make the order of the continuing of the co ing). Sed, Sel., Yapet 450135

Seek Sel., Yaper 450135

Seek Sell, Yaper 450115

Seek Seek Sellon Sello

Atmospheric and Oceanic Physics

Volume 19, Number 2

Tomperature Stratification . Kurgansky M. V. Small Companient Model of Nonlinear Interactions among Internal Gravity Wares

Plans N. Z. Experimental Studies of Microscule Turbulence and Turbulent Exchange in the Cyclones and Anticyclones of the Middle Lutflades

Kahnuny M. V., Sakerla S. M. Medicals of Passive Sounding of Atmospheric Transmilitance in the Atmospheric Surface Layer
Greeko E. I., Dinnov-Klakov V. I. Spectruscopic Measurements of «Additional
Absorbing Masses» in Total and Partial Cloudiness
Vakusheyskoja K. E. Un the Sign Change of the Radiative Flux Divergence Near the Earth's Surface Barenblatt G. L. Yurupues S. L. A Contribution to the Theory of Steady Turbulent Layer Benliny A. Yu., Yoropaev S. L. Zhmur V. V. Simulation of the Upper Turbulout Ocean Layer Evolution during Heating Hemyshev S. G., Eremeev V. N., Ivanuv L. M., Knysh V. V. Passive Scalar Tran-Light Scattering by Sea Water Gryanik V. M. Radiation of Sound by Line Vortices Elansky N. F., Bushchenko Vu. V., Bruzdev A. N., Elokhov A. S. Atmosphoric Ozono Carlent Measurements from Alectaft during the Solar Eclipse of 31 July 108]
Britayov A. S., Elansky N. F., Lukshin V. V., Plakhinn J. N., Khalikava R. Kh., Ozone Concentration near the Earth's Surface during the Complete Solar Eclipso Polenskin V. L. Mateorological and Actinometrical Observations near Halkat during the Solar Eclipse of 31 July 1981 Kuzuetsov M. N. Calculation of the Absorption by Monomer II, (1) Wings in the Khrgian A. Rh. Book Roview: The Hzuna Layer, Ed. by Riswns A. K. for the UN Environmental Program, Pergaman Press, 1979, 382 p.

Grynulk V. M. Dynamics of Singular Geostrophical Yartless in a Two Level Model

Atmospheric and Oceanic Physics

Volume 19, Number 3

Parameters Profiles Using Laser Sounding Data Perusides Profiles Using Laser Sounding Data Petrosida A. G. Extinction and Scattering of Infrared Radiation by Polydisperse Systems of Ice Plates and Cylinders
Kahamy A. S., Klykay A. Ve. Numerical Simulation of Thermal billionice on Emwertive Cloud Development

Zakharuv V. E., Zaslavsky M. M. The Shape of the Spectrum of Energy Containing

Components of the Water Surface in the Weakly Turbulent Theory of Wind Bloudn Va. L., Khagen E., Gurina A. M. On Mesoscale Carrents Variability near North-West Africa Nozdrtu Vu. V., Plakhda E. A. On the Fine Structure of the Waters in the Central Part of the Hed Section 1997 and 1997 a Karimay K. A., Cheholarer H. P. Multy-Year Characteristics of the Cavallation Hegime of the Lower Thermosphere over Middle Asia . Zaks M. A. Lyubhum D. V., Chernatynsky V. I. On the Influence of Vibration upon the Regimes of Disteritical Convection Vulpyan G. V., Mukova V. t. On the Influence of Sea Waves on Wind Profiles and Turbulent Pluxes in the Atmospheric Surface Layer

Surerkulov V. A. Hestotation of Atmospheric Scattering Phase Functions Laking
Into Account the Anisatropy of Multiple Scattering

Steekov S. A., Sushkevlet T. A. The Computation of Haddation Polarization Characteristics by the first term V. A. racteristics by the teration Method Voitsekhnyskaya O. K., Sulukshima O. N. Spectral Hegions for Determination of Bromian and Fluorina Hydrogen Concentration in Earth Atmosphere Zhidko Yu. M., Kanevsky M. B., ttodhi V. V. Wind Norse in Hadar Cantimeter Signal Reliected from Sea Surface .

Polnikov V. G., Fedotov A. B. Nonlinear Effects in a Spectania of Surface Gravi-Intional Waves Khrglan A. Kh. About Development of Atmospheric Ozone Investigations in India Mszin I. P. Book Beview: Clouds, Their Formation, Optical Properties and Effects/Eds: P. V. Hobbs, A. Deepack (Acad. Press, 1981, 497 p.)

Physics of the Solid Earth

Volume 19, Number 4 Tarakonov Yu. A. The effect of major density inhomogeneities on the oblateness Tamkonov Yu. A. The effect of major density inhomogeneties on the bouncers; of the Earth
Greenfeld M. A. The stability and free oscillations of a two-phase planet
Gebarenko V. S., Yanovokayo T. B. The study of the laterally tohomogeneous upper mantle structure in the Sayan — Altai reginu
Zvolynsky N. V., Shkhinek K. N., Chumikov N. I. The plane-wave interaction with a fault plane in an elastic medium
Vasilyev Yu. I., Gvozdev A. A., Molotova L. V., Sokolov V. L., Shcherbo M. N.
On the plasticity condition in soft soils
Mognitskoya N. N., Nikoleyev A. V. The record processing in vibrosoismic sounding
Lutikov A. I., Bovenko V. G. The study of PS wave generation due to diffraction
of P weves by a cylindrical inclusion
Pechersky D. M., Tikhonov L. V. Petromagoelic proporties of busoits from the
Allantic and Pacific oceans Allantic and Pacific oceans

Baroukov O. M. Fracturing and electrical resistivity of low-porosity rocks Baroukov U. M. Fracturing and electrical resistivity of low-porosity rocks.
Yakovlev A. P. Reconling froo oscillations of the Earth with a laser strainmeter Zubkov S. I. On the earthquake energy dependence of the origin time and occurrence area of a felluric field presursor.
Volodin A. A., Zelikman E. I., Dadsdranov I. A., Kopustyan N. K., Nikolayov A. V., Fikhiyova L. M. Tho experience of seismic sounding using the slecklog of signals from on air gun.
Vlasov B. N., Darofeyev I. F., Filolov Y. G. A stochastic opproach to the problem of potential fiolds as poration.

Oceanography

Oceanography

4 of Carculates
Lyderocial No. 10 To Desire a statistic (858)
Lyderocial No. 11 To Desire a statistic (858)
Lyderocial Lubratory, Alel relection where
Monocratical Lubratory, Alel relection where
Lyderocial test and 114 m
Sor recognized statistic market between fire in red
he event 1962 have been recognized by a section
to desire in the operator of the 1982 History
posted annualist to only a cit in the Circ
posted annualist to only a cit in the Circ
posted annualist to only a cit in the Circ
posted annualist to only a cit in the Circ
posted annualist to only a cit in the Circ
posted annualist to only a cit in the Circ
to an engalist of the post distribution of the cit
time terms of cit in extract white sections and the
total explanes. A life of the cit in the section
total explanes. A life of the cit in the section
total explanes. A life of the cit in the
cit in the statistic consideration in the tip the
cit in the statistic consideration beauty of
the offsets of such saccast days a constrained
cit in the remotive failure of Incomparation
trade winds during 1982. (c) hardy line is
a guaranteed source. Tailo hardy a

J. Grephys. Res., G. Paper testes.

ATIS CLICULATIONS OF AN ANTICIPABLE SIM: IM THE LARAGIAN OBSENATIONS OF AN ANTICIPABLE SIM: IM THE MESTERN COUF OF MEXICO A. O. Kirven, Jr. IDopai was at Nation Science, University of South Florids, Sv. Fetogaburs, Storada 11701), W. J. Mercesi, Jr., J. K. Laufa and R. S. Philuser
This analysis documents for the first time she
processes and velocity characteristics of an
emicyclonic rine. The rine was pinched wit from the

long forgont in the fall of 1900 and these time the measure of the feather. I have made in these animals obtained for a more little tracked deliberty of the topical aparts of the state-entities were not a the topical aparts of the state-entities were not a topical animals. The same should be into a surge faiting count of that a frequency cuffers incomities. These fact, the discast and scattering tides, a brain tital we consider, and a rice gravity made. J. treesplayer, Service Co. Paper 400115 all I disculption
A Bufell tog The Amain's St Printing Data with an
A Bufell tog The Amain's St Printing Data with an
Application to A wash ingle in and out of Months
A. D. Klimin, Jr. Hiermichent of Martin science.
Calvoruity of Scale Ulardia, A. Peterbolip, Months
191013, M. J. Metholi, Jr. 7-5, Icale.

loop forgers in the full of 1980 or I musel into the

Injureatify at Scatte Elevable, 61. Peterabula, Flotted 1910[1, M. J. Metrell, 11., J. S. Irale, 8. E. Mattater and 8. themship in the Second of Americal and Second of Peteral And Second of Peteral

which profit the wild provided assistated of the risk resultation of switch well-drive a discount to the risk assessment to resident where the risk was the risk was the effect of the effect of the risk at the r

Particles and Fields— Interplanetary Space

With a composition of the second of the second constraints of the sec A three theory of the trap delice liberation, 200 cm or other control of the trap delice in the long wavelength limit, i.e., ii. CC i where it is not a control of the deality of the trap of the state of the trap of the deality of the trap of the state of the trap of the deality of the trap of the state of the trap of the deality of the trap of the state of the trap of the state of the trap of the tr W. T. D. to the required of intertage, 28 of California.

Sind Sider which interestion with most and planets these when fortsaller trappearents intrinsed if in the cast C what Commonstrate of Outside Particle French A.S. Select of terrestant of Theology and Services, Colorate of Maryland, College Serb, MD foliate, F.M. Liet B. G. Color tier, O. Unvertate, B. Flanker, and M. Color

University of Margins, Calings Fark, MD folial, Fam. [1918]. G. Atta Liet, O. Historialt, B. Flacker, and M. Units:

The charge state cognition of bease Lone, priestly the tash coultregeo-beages which group, has been descated her twalter diffuse pretrie events in the energy per charge stage oil to till belie events in the energy per charge stage oil to till belie events in the energy per charge stage oil to till belie events in the energy per charge stage with the Charge Charge stally reflected in the first limitation of the cally reflected in the first limitation with a charge task recognition that is constant as a limit, with a charge task compatition that is constant as a limitation of energy per charge. It is appeared that the charge task compatition in the tolar task as a limitation of energy per charge. It is appeared that the charge task compatition in the tolar state, and he e for satisfies the cyclithrium containing exception of the coloral temperatures as an entarty with a certary of solar wird lives. In profitch, we obtain assent on the coloral temperatures of tiles, he will be self-exceptible events occurring doring contend his sense target high speed stream, and Coloral contends the continuence of the coloral contends of the coloral target and coloral his sense target and coloral his asset in the coloral color of the coloral colorad target and colorad his asset in the colorad colorad target and colorad his asset in the colorad colorad target and colorad his asset in the for colorad colorad target and colorad his asset to the colorad colorad target and colorad targets and

particularly and the post state of desired for some the content of the polyton opening the actual to the content of th

Particles and Fields— Ionosphere

Sold Automas

As Posiciation bitwick discrete Automa and warnering Bartelle Butwersells. Automa And Warnering Bartelle Butwersells. Beneaville, Al., Brederill Spine Flores Control Butwersells. Al., Brederill Spine Flores Control Butwersells. Al., Brederill Spine Flores Control Butwersells. Al., Brederill Spine Flores will be resembled. We land the account of the war and the account of the war and the account of the protein the account of the protein of the account of the account of the protein of the account of It he privat Beneg & Paper thousand

n in the description of the content of the second of the content o

is a long of the of the first law on the states of the first law in the first law of the fi

Comparisons are presented for the attitude distribu-tions of the concentration ratio between regions representing estroys of the borizontal variation. A simple distribution-collibrium recel deconstrates that the attitude with a temperature on the 6° vortical distribution was a statificant between temperatures as the ettricts of tog respectative on the a vertical distribution are a significant factor leading to the observed striction of the concentration ratio. (Lon composition, light lone, topside Lonesphere, Ogo b J. Coupleys. Row., A. Caper 4A0181

tsat lancepheric disturbances
Low, Weiverschil timiy by the Cuprent Codyective LONG WEIVERSTIL THEIF UP IND SOCIETY, Verbington, O.C. J.P. Huba (Mayal Precarch Laboratory, Verbington, O.C.

J.P. Hubs fixed Passarch Laboratory, Washington, D.C.

301141

A linear theory of the current convective instability
in the long avelength limit, i.e., il. << i where I is
the wavecombet and L ie line scale length of the density
inhomogeneity, is promoted. A relatively simple
diagration equation is derived which describes the
modes in this limit. Analytical solutions are
presented in both the cellisional [v] >> where
in the limit. Analytical solutions are
presented in both the cellisional [v] >> where
frequency it is shown that the group' taste scales as
in the collisional limit and as 14-3 in the location
insertical solutions and very good agreement is lound.
Applications to the surport locaphete are discussed.
d. Seepher, Ruse, A. Fepat (A0109)

J. teching, Mass, A. Paper AA0043

Particle Acceleration Parallel tableways of the terresoft him to

Histories, to Junea, I. D. Winnington, N. Suglard Self-Schemmt.

Department to the instrument parkets on the 2 has been used to study the plants and electrodestants pro-perties of the insuppore about Heldmallgood surrent screening from a not that the self-schem all linds. reprocision in management in the manifest of rent section in the control of the found that the thermal communication and that the current control of the deliberation of the current control of the management of the current control of the books of the house of the current control of a law books of the current control of the books of the current control of the current current control of the current control of the current current control of the current current control of the current I. Coophia. Pis., A. Paper 34149;

1. Coppes. Fig., A. Paper 1819;

10.00 Electron procipilation comes

110 The Precipilation comes Aford Major Ground Based

117 Inform Precipilation comes and Padioscience

1.5. Into Space, Poleromanications and Padioscience

1.5. Into Space, Poleromanication, C. Space,

1.5. Into Space, Poleromanication, Precipitation

1.5. Into Space, Poleromanication, Presented as contours

1.5. Into Space, Poleromanication, Presented as contours

1.5. Into Space, Poleromanication, Poleromanication, Poleromanication, Into Space,

1.5. Into Space, Poleromanication, as well as for radioscience

1.5. Into Space, Poleromanication, as well as for radioscience

1.5. Into Space, Poleromanication, Into Space,

1.5. Into Space, Poleromanication, Pole

Site to at numerical and techniques writiging incorporate professional state of the techniques of the techniques of the techniques and tales and tales and the techniques of the techniques are assumed as the techniques are the techniques are

CATIFUR STATES TO AUTHORITY P. Languist Duchmans (C.d.Y.T. 128, 1910) LANGE, YAMKE 1

In the finisher frequency shift of HY radio waves perfectly referred from the innerphero in celesed to the further velocity profile of the cellecting layer through an integral equation. An alsorithm is proposed to selve this equation when alsoldsacous measurements of the Country for the state of the cellecting layer through the equation when alsoldsacous measurements of the Country fractic from the cellecting layer and the cellecting fractic from the proper of the cellecting fractic from the cellecting fractic for the proper security fractic from propier date. In order to test the liberty, a vertical Doppler sounder has been applove sequentially mercally president of currently well-plus taboratory subjects of currently well-plus taboratory subjects of the cellecting fractic from the propier fraction in the control of the co propagation, lengapheric mos loss;

> AGU MEMBERS Does your library subscribe to the Antarctic Research Series?

Particles and Fields-Magnetosphere

Magnetosphere

Sill Electric Fields
EFFECTS OF OBLIQUE DOUBLE LAYER ON UPGOING for FITCH
ANGLE AND BLOOPHAID

M. E. berseapen (Johns Rophins University. Applied
Physics Laboratory, taurel, Maryland 337071

Observe tions of slectrostatic shocks show the
autoral sone, of uppoing low beace which show evidence
of both parelial and perpendicular acceleration, and
of low conics sognest that the shocks play a role in
the sensgleation of the beams and, perhaps, of cartain
conics. Yo investigate shock elfacts on ions, i
follow the trajectories of many ions through a very
single model of an oblique double layer, a varrow
region of strong electric field with components both
parallel and perpendicular to the meganite field.
Acceleratios through the model shique double layer
produces gyrophase bunching, and hence density
oscillations. Although it arises from a model which
is not self-consistent, this result shows that a
consistent oblique double layer model must include
temporal verialions and/or spatial oscillations in the
density or electric livid. The oblique double layer
lacresses both the perpendicular and the parallel
court of the proposition of the parallel
consistent on greater for 04 then Ior He, in
agreement with observations. I stanine the parametric
dependence of perpendicular energiastion on lutical
ion energy, sugle between the electric and magnetic
field, and width of the potential structure.

(Fisculic liefds, double layers, alockel

J. Coophys. Res. A. Paper 40015

1700 Interactions between author wind and magnetositions of prompts ALFVER MAYER EXCITED BY A SUDDER 17702.

W. Bauricham (171 für octraferrentrische Physik, 1700 Carching, Volumenmy), H. Junginger, G. Barresdell and O.R. Dause on Them by Junginger, G. Barresdell and O.R. Dause on Them by Junginger, G. Barresdell and O.R. Dause of the March at later through the high in the relative leading of the remainer region but its probable cause in an in-erone of the Altrén relacity due to the congression of the consistent here accordated with the modern involve. (Thomas action, effort partial variations of Empolic (;-14), J. Geophym. Pow., A, Paper 4A0144

5736 Engetio teil
COMMENT ON THE OFSERVED PLASMA DENSITIES IN
JUPITER'S DISTANT MAGNETOTALL IMAKE!!
A POSSIBLE EXPLANATION
S. Gracdislak! (Space Research Center,
Poiled Needowy of Sciences, Ordeos 21,
PL-01 237 Wareas, Foland!, M. Macek
The relatively high Joyien lail Iwakel plasma
density ~ 2 - 3 : 10 cem observed by Voyager
at anti-aumward distances from Jupiter of
3 - 4 AM indicate that the tail cavity is
costinuously supplied by color wind plasma
lecking through he hall boundary. It is shown
that this inflow could explain the average
density measured in the cavity if one
density discontinuity. The svarage rote of
colar wind inflow into the Isli is then
described by a phenomonological parameter a
that describes has average efficiency of
redensaction. The observed value of Isli plasma
density can be reproduced if the global, tail
averaged value of a that takes into occount
the "windowe" and patchy" structures, is
~0.5 - 0.4. This value is also well which
the range of estating theoretical estimatas.
| Joylan megnelosphere, megnetic tail,
boundary layer, rotational discontinuity!

J. Caophys. Res., A. Paper 4A0107

9755 Please Instabilities
INV-ALITUDE IMMOS STRIATIONS ASSOCIATED WITH
BOTTOUS IPF EQUATORIAL SPREAD E--OBSERVATIONS AND THEORY
J. F. Vickrey (Radio Physics Lab., SRI International,
Madio Park, CA, 940151, H. C. Fetley, R. PEaff and
S. R. Goldesn

its presipication induced by ground-based VLY items—
sixteers.

J. scophys. Feb., A, Paper 400121

3930 Wass propagation

MCCLATED SEAN EXECTION FROM THE SFACE CHUTTLE MERING
MAGRIEC COMPINETIONS BY SIS I WITH THE OS I SATELLITE
L. S. IDAM Spaces, Telecommunications and Radionclence
laboratory, Stanford Dulwer Lity, Stanford, CA 94001, M.
Jon, F. B. Banks, Y. R. Williamon, W. J. Poitt and S. b.
Sinvan.

As effection ham relited from the effice of ipere
Science I palled on 573 3 was pulsed with specially designed very low frequency (VIEI formats in an attempt to
generare whitsler wide caves. Modelated operations of like
low sentiated during tiens of magnetic conjunctions between 514 1 and the high-altitude Ff issettlife equipped
with broadband VIF receivers. Coordinated EFEG/VIF modvicin by a fact pulse slection games and vice-very of image forvicin in 37 different cases. By swidence of only ways generated
to 18 different cases. By swidence of only ways generated
to 18 a stand that the cultive delerations sizuck
the main 1-by of the wealties, or It was may possible for
whittler mode waves to propagate from the STE 3 location
MAGRIEC CMIMENTIONS IN C. Feiley, R. S. R. Allegan in the parameters. Mowaver,
tessue electric field of macus electron to a fact the model to a merce and call y unstable region of acally unstabl

nia, 900241, R. L. Herbetton and T. Toratava
Depondence of the power appeature of PC 1-6 haghetic
pulsations observed at the ATA A gaosichturous statelits on the interplanetary organization field lift) has been
studied. Fulsation overish that were observed near most
and which the determine uttention are chosen for smalgsis. We further spilert pulsations avonts with identical
fundamental iterponary to state dependence of the power
of pulsations at different hardwater bands so the DW. A
work negative correlation is observed between the DW ones angle S. and the power of pulsations in the
industrial tale interfer of the PW is Squpt and the power of
pulsations at No-76 rdiz is found. This Opposition is
present at all ranges of the requester of borshociassociated upstrom waves predicted from a model of ware
this observation with the Irequester of borshociassociated upstrom waves predicted from a model of ware
tee haw shock. The predicted frequency depends on the
IMT as Oppositionality between the irequester and bype quelificatively consistent with the observation, it does not
overlain the most solvinus life control of the spectrum of
the pulsations. (interplanetary magnetic field, manetic pulsations.)

1775 Particles and Flotin-Highstonicous LETERAZ LOW THEORY FOR POPULATIONS AT LOS EQUATORIAL ALTITUDES
D. J. Williams | The Johns Hopking University, Applied b. J. Williams The Jules Septim University, Applied Typeice Laboratory, Jules Guykins Unsel, Laurol, Maryland f07071, t. A. Prank The combined data true the 1882-1 medium agery and plasms instruments dave identified the evistance of surptising epectral structures in the trapped Los population at low equatorial distinctes, 2 £ £ £ 4 and 4 100. By analyzing our insertments of responses at the iteles of their capabilities, we are able to resolve a double peak structure just below the

narrow | A - 0.41 energy posts are observed. eq conclude that the higher energy [HEI] peak is composed of protons and toat the lower energy [LE] peak is easien up of singly ionized ions Π^{\pm} , Re^{\pm} , O^{\pm}]. As L = 3 the empty is located at ~ 17 heV and the LT peak at ~ 17 up of singly lonied into Hill, no. O I. A E ~ 2 Lise so pack is located at ~ 17 how and that II pack at ~ 17 hev. The energy of the peaks increases at L decreases and the infensity of the peaks is ~ fillow long the main ment have the construction of the decreases are hev. Orbit geometry and available data recordings allowed these lone to be observed for the six ment peaks to work the local rise range ~0308-1500 hours LT. These charactestaries plus others exchange litelizes pose severe boundary conditions on prestite source and injection medianisms. Of those considered, bon cyclotron acceleration of thermal long in the pressue of an anisotropic energetic population appears a litely source of these questronous expetit peaks. Additional peaks in the energetic lone species are observed at smarging 2 40 NeV. Home of this higher energy structure may be related to cross-L diffusion of autici-component ion populations. ot mulci-component ion population J. baophys. Sas., A, Paper 4Auleb

5/15 Trapped Partiates
Flion Angle Diffusion in the Jordan Magnetodise
T. J. Birgingham (Laboratory for Estraterrastrial
Physics, MASA/Godderd Space Flight Conter, Greenbelt,
NP)

OWHERT ON THE ORSERVED PLASMA DENSITIES IN JUFFTRY'S DISTARY MANNEYORALL [MAKE]!

A FORSTBLE EXCLARATION

S. Gragdeleight (Space Research Cenier, Feliab Aedomy of Soloncas, Ordicea 21, Fi-01 277 Warcews, Foland), W. Macek

The relatively high-Govign tall worked plasma density was 2 - 3 : 10 one observed by Voyager 3 - 4 All indicates that the tail cartiyle and the control supplied by color wind plasma leaking through the tails the average density measured in the cortiform of disentimity. The average rots of color wind inflow into the lail is then rothiomal disentimity. The average rots of color wind inflow into the lail is then rothiomal disentimity. The average rots of color wind inflow into the lail is then color wind inflow into the lail is then average officiency of rodesmotion. The swrage officiency of rodesmotion. The swrage of relating the average officiency of rodesmotion. The swrage of relating the average officiency of rodesmotion megnetomerous manners and the surgery of the surgery of the color wind in the range of celating theoretical limites. Live in the range of celating theoretical limites. Live in the range of celating theoretical limites. Live in the research of the limites are surgery of the lattice cover roto Abi INICCTION, I. ELETTONE

1. Georghys. Ras. A. Reper Mil48

Live in magnetic powers and special of the research of the lattice cover roto Abi INICCTION, I. ELETTONE

1. Georghys. Ras. A. Reper Mil48

Live is the research of the lattice of lattice and produce of the research of the lattice of the latt

1199 See(or Wind Internstitions with House and Flamets SECTION: 15 HE INNOSPHEE OF VIOUS
P. 2. Clouder (Space Physics and Astronomy Departments of Chieffelle, P. 2. Rogers, Physics and Astronomy Departments of Chieffelle, P. 2. Rogers, Taxas, 1725 F. 3. Posting (Space Physics and Actrogram repartments of Private Pay, Fo. Now Pett, Romeston, Passa, 172511 in this paper, we examine the formation and dynamics of largue-to-take engaged in true records and department of Largue-to-take mach attractures much be the redult of temperature to the benegative let the small assume of solar wind plants (a 1-5 % absorbed by the plants) of take plants of large fields persisteing for long periods without connection to the solar-wind-induced current and restriction pattern. In particular, we demonstrate that its comment for the solar-wind-induced current and restriction action in particular, we demonstrate that its comment for the solar-wind-induced current and restriction attention of 110 finance for in finance, if they were not steady-state attractures so connective and difficulty equilibrium, it is absorbed induces, if they were not steady-state attractures in connective equilibrium, constraint the diffusion of 110 man abspective structures are identical to those governing diffusion will, and a simple analog is litustrated. The application of these results as magnetic fields of attracture of these results as magnetic fields of attracture of these results as magnetic fields of attracture of these results as magnetic fields of attractures. A. Paper 40098

Physical Properties of Rocks

diffusion at historic reals also. Buth a scale-aire defination at historic reals also. Buth a scale-aire dependent diffusion process is arequired compation in planes. Heregulerities, consideration, consideration of process is required compation, and the process is required compation, and the process is required compatible. The following process is required to make a process of the discourt process is required to make a process of the discourt process. As Paper 48011

MAN Planes instabilities and instabilities constitute the process of the constitution of the planes and the process of Interest of congressive and dath are not yet longiets amough to desired the control of the contr

FIGURE STREET, fresture, and flow
EFPECTS by CMPRESSION DIRECTION OF THE PLASTICITY AND
RHOLOGI OF EVROLUTICALIT VEAKENED STRINETIC QUARTY
CEVETALS AT ATMOSPHELIC FRESSORE
M. F. Linker [U.S. Geological Survey, 345 Middilled
Road, Monio Path, Colifornia, 94013), S. H. Kirby,
A. Ord, and J. M. Christie
A hydrocherzally grown growheste quarts crystel with
100 ± 50 yes bydcoxyl laputly wes cut into tight
restangular prites to eight crystellographic orientasiams. We cappressed the pelus under tomesant relail
force corresponding to a anlaxial stress of
140.5 ± 0.5 MPa, and semptatures of 310 and 550°C.
All but not of the sampias souttened parameter smill
strains of 2 to 3%. We established the operating slip
systems from specialt inhost change, ellp hands and
ditlocation such pils on polished surfaces, crystallographic ortestation changes, attrae-optical features
to this sections, and from stammission electron
alctoscopi. The observed creat pelayolt and
planticity divided the samples into three groups:
(1) Grystels compressed at 43° to 100011 end [1110]
and those compressed [10111] and [00111 delorend
principally by slip penalist to [5001]. Greep raise
were relatively high and were not strongly sensitive
to test semparature. Bislocation strays aproximately
parellel to [3110). These samples were loaded normal to
[60014 in stress orientarione: [1211b], [10100), and
at 45° to [1100). These samples were loaded normal to
[60014 in stress orientarione: [1211b], [1010), and
at 45° to [1100]. These samples were loaded normal to
[60014 in stress orientarione: [1211b], [1010), and
at 45° to [1100]. These samples were loaded normal to
[60014 in stress orientarione: [1211b], [1010], and
at 45° to [1100]. These samples were loaded normal to
[60015 the strest group of samples were loaded normal to
[60016 the strest group of samples were loaded normal to
[60016 the strest group of samples were loaded normal to
[60017 the stress orientarione: [1211b], [1010), and
at 45° to [1100]. These samples deformed prinartly by
[7007 the str bersiy detectable rate ("10"% 1 and no optical-scale sity lasturts were observed. These results smaller our sarilat work on one orientation each iron groups (1) and 121 which todicated a strong creep anteotropy for this same crystal. This treep anisotropy parallels a remarkably stallar anisotropy in the diffectivity of impurables in quarts, suggesting a causal religiouship between imputty diffusion and creep associated with hydrolytic weakening. (Quarts, synthetic quarts, thoology, hydrolytic weakenings.). Smoophys. Rom., 8, Paper Aphil 23

synthetic quarts, theology, hydrolytic weakenings.

1. Scophys. Eon., 8, lepper ADD25

6110 Elasticity, Practure, and Flow
EXPERIMENTAL DEPORMATION OF TUPAZ CETSTALE: PUSSIBLE
EMERITALIZATI BY INTRACEVETALLINE WAIFS

K. W. Lee and S. B. Kirby (U.S. Geological Survey,
1845 Hiddheliold Road, Renio Path, CA, 94073;

Crystellographically oriented single-crystal prisms
of gea quality copex (composition Alysio), 1014, 71-1, 1

where g = 8.4 ± 0.01) were deformed at a continue,
pressure of 1.30 CEA, g temperature of 800°C, and a

strain rate of 2 x 10°2 s 1. Under nearly identical
conditions, all crystels of anhydrous rock-forming
whereis that beve been tested to date, such as
clivine, quart, Eclapara, pyroxeness, and refractory
outdes, diform platticality in contract, our copes
crystels islied by brittle Incorner, and refractory
outdes, diform platticality in contract, our copes
crystels islied by brittle Incorner, and refractory
outdes, diform platticality in contract, our copes
crystels islied by brittle Incorner, and refractory
outdes, diform platticality in contract, our copes
crystels islied by brittle Incorner alien, and refractory
outdes, diform platticality in contract, our copes
crystels islied by brittle Incorner and refraction. Bo
optical vidence for plantic deformation was
altered. Another suite of coperiments with compression perpendiculat to the 1001; cleavage at I = 190950°C and a strain rate of 2 x 10°2 x 10°3 x 10°4

regimes of behavior: 11) at J = 30°C, tracture
occurred on one or two suiteces perallel to 1103;
(2) at I = 400°C, the Incorner strength increased
rapidly with decrossing semperature, no macroscopic
stress drop was observed, and many cloudly spaces
conjugate Inactures formed on 1103) and 11031. The
encasions britishness of topse copared to unhydrous
silveds and wilde crystals indicates that interfystalline "water" plays a role to the sabritithesal.
Versuggest that water within the topse crystals
promotes Inacture in way significant to the acchanisms
of view crack growth aidea by en

Planetology

West flaterplanning such (50% (Falsocities) and Early Price Collegeation Union Falsocities) about a such Early Price Collegeation Union

(50) (*electrical and targor Phote CHIPMANIA UNION PRETICE, BRIATION and TARGOR PHOTE PRITICE APPROPRIE PACKAGE OF THE BUBBBCAR PHIPMANIA TOWN, AND ADDRESS OF THE PRICE PHIPMANIA AND ADDRESS OF THE PRICE PHIPMANIA AND ADDRESS OF THE PRICE PHIPMANIA THE PHIPMANIA THE PRICE PHIPMANIA THE PHIPM

SSING OF HETEORITE PARENT BUDGES

DEGASSING OF RETEORITE PARENT BODIES

1. Deglura, M. S. Sers and D. V. Strangsey
Theparcaset of Reology, University of Torontol
T. Marsal

5as Parasability of three chembrices was massures.
A typical Sime For degassing all a 100-km-radium
percut body wes calculated based on those parasabillsy values. Is wes found that an ordinary choodrile parent body would act as an open system
during the matemorphic portfol [100 m.y.), while un
ematatics chembric percent body would act es a
closed system. The possibility thei volstile
niamor cancentrations to chembrics are controlled
by parasability is discussed.

J. Gooden Sers. J. Gaophys, Ras. S. Paper 385009

6575 Surfaces of PlaneIs Yeurs: THE NATURE OF THE SURFACE FROM VENERA PARRAMAS J. B. Garvin (Dept. el Gaological Sciences, Brown Univ. Pravidence, RI 02912), J. M. Mpad, M. T. Zuber, sed P.

J. B. Garvin (Dept. at Gological Sciences, Brown Univ. Pravidence, Ri 09912), J. Y. Head, M. T. Zuber, sed P. Melfantlein
leaget of the surface of Vemat obtained by the Soviel Yenare 5, 10, 13, and 14 landert have been analyzed to provide a beals for understanding the natura of geologic processes operating there. The four speceralt landed in the Beta-Pheeba rection at redlam devellors in the upload relling pisins province. The lending points are each separated by distances of more than a thousand in. The Yenera panoramas were digitized and transformed into warlous perspectives in order to facilitate analysis and comparison with other planetary surfaces. Bedrack it expassed at the Yenera (i) 1, and id sites and is characterized by semi-continuous, flat polygened to subrounded patches up to several m in width. The bedract surface it often dominated by two-horizontal to subrounded patches up to several m in width. The bedract surface it often dominated by two-horizontal to horizontal layared plotas with thick-nature of several or and abundant linear and polygenal variated fratures. Angular to subangular layered to pisty blocks in its 5 to 70 cm range dominate the Yenera 9 site and occur much loss frequently at the other sites. Block appear to share any characterights with the separated bedrack and a interpretad to be largely derived from it. Solis (particles of cr) are abundant at the Yenera 5, 10, and 13 aftes, but are uncornon at Yenera 14. Sepatures indicative of a strong editan influence (nosis, dunas, wind tails) are not cornon at Yenera 18. Sepatures indicative of a strong editan influence (nosis, dunas, wind tails) are not overed. A striling sepact of the Venera loading that the broady platy nature of the surface is analogout to the rolling and undulating noture of the veneral loading that from surface layof lows. In this interpretation, the broady platy nature of the surface is analogout to the rolling and undulating noture of larrestriel paleohod lows caused by the lornation and domastion of a semi-solid

all and their sixts beself compositions, respectively. It this interpretation is correct large regions of the Deta-Photoe ores are tisely to be chresterized by law lives. The relative fresheets of features observed by Venera it suggests that some bedreit surfaces are gen-logically power, or that erosted refer or the. (Years, Venera Conservation)

Venora, quamorphology).

J. Neophys. Bas., E. Papar aBol63

ANS Estace of planets limpact nataborphism!

CREMICAL AND SFEDUTURAL CHANGES INDUCED BY SITEMOM.

ANNEALING OF SHOCKEP FILERAGE INCLUDIOSE IN DEPACT NELT

ROCAL THOM LAPFAJÄREL CRATER, EINEARD

A. Bischolf finative for Mineralogic, Correspantable 32,

O-4400 Minator, M-Carmanyl and P. Bioffier

Yinglociase and picrocline of classic ninoral and roct
inclusions in impact melt rochs (libralite) were suspled

from the coherant well obset located in the control

crater area of the impagified meteorice crater and
analyzed by optical, electron optical, x-ray, and birroprobe methods. Both types of foldspars display strong

chaolism, teatural, and structural alterations compared

to the foldspars of their permission representations of and the properties of the control of the control

not the molt results in increasing thorsal alteration

by the seit. In a lower degree of shock both primary

plagiociase and microcline cransions to "checkerhoase"
textured grains which consist of 3-10 pm sized subgrains

of succeitacily grown saidline and querte. The subgrains

of succeitacily grown saidline and querte. The subgrains

of succeitacily grown saidline and querte. The subgrains

are strongly noned, disordered inbradocite to anderino,

rizmed by sanddiue, in a high degree of short the small

subgrains are larger and randomly oriented. The sub
grains are the result of a non-aquilibrium tractional

crystallization from a liquid state during which a

atrong themical eachange between the main and the

classic debria was in the range of 1800 to 2100°C. The

apullibration temperatures of the class-celt mixture in

setingate accordingly to be at least in the range of

1100 to 1140°C or higher doparding on the magnitude of

the clastic debria was in the range of liguidus

temperature of a dry gracodicular that the clust-inden

Lepa Birvi crater, impact methods that the clust-inden

Lepa Birvi crater, impact methods that the clust-inden

Lepa Birvi crater, impact methods

Lapajervi crater, impact matamorphisms.

d. Geophys. Res., S. Paper 185124

4513 Series of Planets
A PROTOMODO betols For FALIMPREETS AND ANOMALOUS FIT
CRATEES ON CANTYNEOS AND CALLISTO
S.S. Ceoff Luner e Flanelarg Labotatory. University
of Arisons, Tucson Actions Shift!
Palimpreets and sackalous gil cratets are two
clatese of cratets found on the leg satellies
Compands and Callisto which have no chylous
contemparts among the crater populations found on
roctg planets. The distiss! characteristics of
palimpreets and anomalous pil cratest in morphology,
morphomatry, and population statistics, which
differentiate them Iron the more numerous "horsal"
craters and helms on the leg tatellites, also
vitually purelude their origin as normal craters
that have nearly wealehed through viscous
relatation. An alletante origin is proposed:
palimpreets are printing impact structures formed
when the flow of material during the modification
sings of crater formation is dominated by "west "fund
illow as opposed to "dry" granelat flow which forms
normal craters; tenditions of "west modification thow
occur than its volume compatable to the volume of the
translant craters. By use ol an impact model which
includes: 1: plansible impact calcity
distributions, 2: crater tealing in ice. It should
saling in ice, 4: Thermal profiles as a function
of time in Compands, and 3: cratering ilow field
toostraints, conditions for was modification liew are
found to occur for sufficiently large impacts or
high-velocity impactors. The range of sormal
crater-palimpant transition diameters and the
morphologic characteristics planers from the impact
which have impact velocities one the aspective of impact
or impactors at shout 30 km/s, and palimpreets by
impactors travelling in secent of about 40 km/s
there is a second ocder effect, but sufficient to account for
the difference in palimpset, population between
Outpreeds and Callitto if Conymed occe had a liquid
menta while Callisto elther rescined consiled
menta while Callisto elther passined consiled
on J. Geophys. Rus., S. Paper 185124

Seismology

6978 liructure of the Crust and Upper Mantio
A trisuic REFRACTION STUDY OF THE DEFINITY CASCADES
D. 1. Leaver Edephysics Program, University of ManhIngion, AX-50, teatile, MA 98141, W. P. Myoner, and
W. M. Kohler
A 275 km long rowarded retraction profile along the
avis of the Pregun Cascades, augmented with earthquake
and gravity data, indicates high crustal velocities
(b.1 to 7.0 te/s), thick crust (& io), low Poweler ity
17.7 km/s1, and flight upper month velocities
(8.2 km/s at 100 km depth).
J. Geophys. Res., B. Paper 4e014

Social Sciences

The Schooler of Shellatte Charles in Parliants 1000010 Schooler of Shellatte Charles in Parliants 1000010 Schooler of Shellatte Charles in Parliants 1000010 Schooler of Shellatte in Parliants 1000010 Schooler of Shellatte in Shellatte in Shellatte for the Parliants atternative water rangement system for the Parliah the language that carrent shell of course the Parliah coursel in Indiant. Shellat Frantise that carrent shell of course stellar shell in Indiant shellatte for shell in Indiant shellatte forward for the Indiant shellatte coupling system. Clause during February on in April of or wheat tearned increases promise returns by look delians per bedung, because of, with a secondarially indication are precedent configures for the stem. Only offer per better water with all increases in the profes in theory or house water all rather profes in theory or house consideration tenders. In the shell she are the increases in the profes in the profes in the profes in the profes in the profession, conjunctive seal. United Shellatte Shellatte

NOTE: FOR CONSTRAINED OFFINIA WATER FAILING AND CAPACITY EXPANSION OF CONSTRAINED OFFINIA WATER FAILING AND CAPACITY EXPANSION OF CAPACITY OF CAPACI Mater Besout, Ret., Paper 44009)

Solar Physics, Astrophysics, and Astronomy

1130 Gauss Rey Astropost PLIQ Gamma Bay Aleropomy
ATHOSPHERIC GAMPA RADIATION: A COMPARISON OF EXPERIMENTAL EXPUTE AT 1,3 GV AND 11.1 GV
LAUSEAN (CESECOND/UPS 8,P. 43A6 -31Q29 Toulouse

cedex - France], M. Siel, G. Vedrenne, B. Agriniet
"Agathe", a joint C.4.A. [Isrlays-(15% | Toulousei esperient, it a sparh churber for garma say measure setts in
the 1-4 Nev energy range. It was used to measure the line
of attospheric photons at 1--33" geographic latitude
rispidity ii.1 GV during two lights line Brazit, in the
course of a campalgu organized by the Franch Space Agency
[CMIs. The results are compared to those obtained from
lights of the ongineering model of Agatha and a model
lor a time of light system, tested to evaluate improvaments for the Agatha espectrant.

lor a time of light system, testal to evaluate improvements for the Apatha expertrant.

The folkering teacher were obtained for the energy ranges 4-10 MoV, 10-25 MeV and > 11 MeV:

determination of the attoospheric gazza cay fluxes or count tate as a function of pressure eliticals t in these energy ranges the downward etcospheric flux is proportional to fo with a * 1.

- the determination of the atmospheric epacerum at 1.

-33 in Small and at 1.

Small the downward strongheric apactrum can be represented by igy = f.4 lb-1 T-1.4 photome/cr2.s.s. MeV g/cr2 in the 4-100 MeV energy tange and 8 cg; = 2.4 lo-2 g-1.9 photoms/cr2/s/ss/MeV g/cr2 for E-100 MeV energy range.

range.

- the determination of the ratts between the fluxes
measured in Brazil and in the Horthern bemisphers : this
ratto is 1.8: 0.3

It has been shown that the fluxes of downward and
upward rowing garms rays are equal at a pressure of about
40 bb.

No th.

The dependence of the downward caving fluxes as a lunction of the pressure is different of that published by the same as the component is lesscaped at 40 mb, the apparimental fluxes determined here the saperiment of scribed here, agree with the messured fluxes rise has a cause by ling in these calculations for the 4-1b MeV energy range. (Seywords: gama tadiailon - atapspheric componenti. J. Geoghym. Hem., A. Tapen BA1958

Tectonophysics

Appropriate to provide a manufacture of the provide and the control of the provide and the pro

The Hard to the Second Section 1 of the Act of the Control of the Act o

p. Provide a series of the control o

And Plate Tectomes
RODF SPACE SQUAKE VALUACILIES OF THE CONTIVENTS WITH
RESPICE TO THE HOT SPORS NINCE THE EARLY SURASSIC
Frederich R. Scholt (Dupariment of Geophysics, Stanford
University, Stanford, Californa, 81307) and Richard G Gordon
The root mean square velocities of the major continents
with respect to the flot sputs were estimated for the pest 180
my, by combining per-lowery published pilet reconstructions.
These velocities agree well with velocities relative to the spin
sits interred from paisonne, pooled data From ~199 my BP
to ~146 my BP. the hot spot data induceds that Laurania,
moved rapidly, ~70 mm/yr, but the reconstructions permit a
velocity as low as 50 mm/yr. We size estimate that from ~93
my, BP. to ~45 my BP. Index moved rapidly (~1462%
mm/yr), leater than the present velocity of any piale and
more than twice as fest as the present velocities of several
subducting occasie piston (these attached to downgoing slabs
along a substanied fraction of their margin). The data require no other continent to have excueded a velocity of 40
mm/yr during the last 1800 my
In agreement with previous studies based on paleomagnelic data end in agreement with previous studies based on
non-interque malyses, we conclude that the continents have
moved feeter, accasionally much faster, than at prevent
Prom this we inter that continental thosophers is unlately to
have much greater resistance to piles motion than occasiontithosphere. Instead, occasion plates into motion in an occasiontithosphere. Instead, occasion plates into motion of a pilat that
motion of a pilat that includes no continents lends to persist
longer than \$45 subduction and rapid motion of a pilat that includes no continents the data to prevent
longer than \$45 subduction and rapid motion of a pilat that includes no continents that the velocities of subducting plates can say by a factor of 2. Thereleas models of the derivant forces of the plates that predict a
uniform velocity of enhancements. continents a costs;
J. Geophys. Sec., 8, yaper

Bist Plate Pectorics PSOMMATION AND EINFALE OF OLDANI: FIDET BLUMENIS B. B. FOLLAND (U.S. COSTORICS) Success 45 Midwelffild Book, Monto Yark, CA, Saulist, and

 Authors
 So have intentigated the propagation or aptracting pidger and the development of Secretarian that line
 Se have interligated the propagation or speeding ridge and the development of anothers that the interligate and engaged and engaged as less an analyst Primary ridge and engaged and a publication that our their controls propagation force and a publication that continuing recognition direction that enturing the religious propagation force increases as ridge enturing the propagation interior increases as ridge enturing approach, but then declines awards at the soon plant, or ridge awards as seeing account of the soon plant, or ridge awards as seeing account of the soon plant, and the soon plant and poss, so the avertapping ridge ents and diverge and then converge tollowing a man amount of the plant of J. Grophys. Ses., B. Paper 480172

Siso Flate Tectorics

CORRELATION OF PLATE MOTIONS WITH CONTINUATAL EXCHANGES:
LARGHIDE TO ASSERTANCE

D. C. Engabreison (Continues) of Gooley, Vestern Washing.

J. Grophes, See., B, Paper 490151

toe University, Pellingham, WA 983fil, A. Cox and G. A. Thorpson

Summer of the major tectonic and magnetic events of the Thospaon

Size of the major tectonic and magnatic events of the
last 13b Ha in the Western Cordillers can be correlated
with a may nodel for the displacement histories between
workers Sorth Acerica and adjacent oceanic plates.
Sierts Revada plutening ended and Larcalda compression
began during increasingly rapid convergence of the Farsiion plate with Morin Acerica and during a moderate
increase in the westwarf rution of Horth America in the
botspot relarence frame. The end of the Latanida and
beginning of videspread are angusten and retension
cutrelates with slowing of hoth of these contens. The
speciacular slowing of fatallon-Norte America convergence is attributed to the decreasing age of the tarsiten plate entering the transh and show to a change iron
negative to positive beganery. The translation iron
widespread arc-related togenation and rapid extension to
bessite volcanies and coderate entersion in the Suis
and Enga province links no ready anylanesion in the
plate entering the transhament of the first independent on the
plate entering the transhament of the first independent on the
plate colours of the Sais and Runge province accompanied
growth to length of the Sais and Runge province accompanied
growth to length of the Sais and Runge province accompanied
growth to length of the Sais and Runge province accompanied
growth to length of the Sais and Runge province accompanied
growth to length of the Sais Amircus Lault as the Mandacino triple junction progressed nottheard. The total of plate mostone, Warth Americat. Techtonica, Papet ITI886

plate mesture. North Americal
Techtonica, Paper ITIBOG

RIS Statistis of (Ripit Ductions)
ON HE Statistis of (Ripit Ductions)
AND HIS Statistis of (Ripit Ductions)
AND HIS PLATINE IN DEPISORICIE
The Statistis of Vincent Countillate (Institut de Physiques du Globo de Petin and Unité d'Enseignement al de Recharche des Sciences Physiques du Globo de Petin and Unité d'Enseignement al de Recharche des Sciences Physiques du La larre, Universités Parla 6/7, Parlai de conventent tepresentation of Italia Junction that Involve only tidges (R) and Iransform faulte (I) le proposed this representation rombines in a dimple sty information from geographic and velocity information from geographic and velocity spaces. The velocity strengte and velocity spaces, the velocity strengte and velocity spaces. The velocity strengt and interesting provides that budgel of lithespheric nuties change which directive tealth from trusts junctions of the trusts junction of the relative partition of the trust provider that are coopeithir with a given strange, Palen at triple junction reoffiquent to interest that the of partition rooffiquent that the of partition rooffiquent into the models of the triunite, of interest on the country of the triple partition of the heavy of polythality and their contingent on the limited from the partition of the heavy of the contingent on the limited in transfer and the class of the satisfactor of the partition of the heavy of the contingent on the limited of the contingent on contingent on entities of the contingent on maps, and related rooms that, of hapsy charters and the table related spreading wheelther. Bits adaption and greater as entire supportion that activity at constraint adapt the effective and technic subsy-corresponding here to 190 and to 190 and contiguiting respectively, been ended approad to alternate in operated that the table the constraint and constraint the title line constraint and constraint to this line constraint and constraint the problem.

Volcanology

Right General Colorated for the colorate to the form of the colorate colorate colorate to the colorate colorate to the colorat

Boss Volcanology topics AND HOLD PATES AND CHEMOSTHICAL INFALS AT LOS CAMERIS ENGRANGE FERTES, DEBLA, PORTON
H. Farris Lapitet Farth Sciences, Stanford Enderoide,
Lantonia, California, Wildel, B. A. Hidned
Low Rocerts volcanie, center, 18th by R. of Resico
City, is one of succest Piletro-ero militale centers
in the "half-are" portion of the Porton Sciences
tell. Average enquitee rates in recorded Hills free and
exceeded rates of sugmeration of differential desamples
telled to the supplementation of differential desamples
telled to the supplementation of differential desamples
to Records calders little, The Intervite is inversed by
the Fabre Tuff, a significable in Intervite is inversed by
the Fabre Tuff, a significable in Entwinter in inversed by
the Fabre Tuff, a significable in Entwinter in inversed by
the Fabre Tuff, a significable in Entwinter in inversed by
the Fabre Tuff, a significable in Entwinter in inversed by
the Fabre Tuff, a significable in Entwinter in the condition of
the Tago with expectation of the superfacility in
advantage calders a little receipt the first live in
Petersen U. Stanford Range, and east of little problems
the condenses of the two religious. Activity conditions
of the Tuff is successful to the anti-ben winging
of the little problems in represented the supplement of
the ring fracture of the authors of the actions winging
of the ring the two bound bend where the number of supplement of
the ring fracture of the and they marks coinciden. The
laters using a look arises in terresic for engine of the least of the later of the later of
the flat in the least of the later of the propersion for the propersion of the least of the record of a graphes later
description in the superface of a graphes later
description in the superface of the record of a graphes later
description in the superface of the record of a graphes later
description in the superface of the record of a graphes later
description in the superface of the description of the propersion in the state of the later of the description in the description o EMPILOS PATES AND CIT 0.29 Act 12 in the lest 0.3 Ma. This increase in emptive rate may have been rive results of a progressive decrease in the attentional integrate of the read series ancreasing selection and results are since and increased and results are intermediate magnated disrupted real allowed maint and intermediate magnate as reach the surface as integral applies, decreasing their residence time in a high-level terms clumber and these they available for tirt delices attacked.